QUANTITIES.

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QUANTITIES.

QUANTITIES:

A TEXT-BOOK FOR SURVEYORS,

IN TABULATED FORM,

EXPLANATORY OF THE BEST METHODS ADOPTED IN THE MEASUREMENT OF BUILDERS' WORK, AND CONTAINING MANY USEFUL HINTS AND MUCH VALUABLE INFORMATION FOR THE SURVEYOR.

COPIOUSLY ILLUSTRATED.

AND CONTAINING ALSO

TABLES OF THE VARIOUS TRADES,

AND FOR THE MEASUREMENT AND VALUATION OF DIFFERENT MATERIALS.

WITH

TABLES OF CONSTANTS,

FOR THE VALUATION OF LABOUR,

COMPARATIVE TABLES OF DIFFERENT COUNTRIES, &c.

And a complete Index for ready reference.

BY

BANISTER FLETCHER,

FELLOW OF THE ROYAL INSTITUTE OF BRITISH ARCHITECTS.

(*Author of* '*Model Houses*,' '*Dilapidations*,' '*Compensations*,' '*Arbitrations*,' &c.)

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PREFACE.

THE great success of my former books has induced me to issue this.

The successful system of Tabulation followed in those works, will be found continued.

I may add that I have spared no trouble in endeavouring to make this book what I trust it will be—a complete text-book on "Quantities."

BANISTER FLETCHER.

29, NEW BRIDGE STREET, BLACKFRIARS, E.C.,
September, 1877.

CONTENTS.

CHAPTER I.

PAGE

Introduction—Builders' Quantities—Works of Reference—Letters Received from all Parts—Present Work as Articles—How Received—Former Works Inadequate—Progress of Professions—Revolution of Systems—Old Methods Superseded—Hard Work Necessary for Success—Subject Confined to Quantities and Valution—Surveyors' Handbook—Instruction in Condensed Form—Useful as Reference—Condensed as much as possible—Glossary of Terms—Items Scheduled—Based on Practical Experience—Ablest Writers—Rules—Metropolitan Surveyors have Greater Experience—Uniformity of Measurement—Differences among Surveyors in their Methods—Whence Differences Arise—Measurement not Confined to Surveyor—Builders Take off Quantities—Not so Minutely—Improper Methods—Provisions for Discrepancies—Ignorance of Technical Terms—Cause of Wide Tendering—Builders knowing Surveyors have Advantage—Example of Re-measuring Refused—Deduction Made by Some Builders—Essential Points to be Noted Before Proceeding—Knowledge of Art of Building—Rules of Mensuration—Tact and Patience—Accuracy and Energy—More Care Required in Measuring from Drawing than from Buildings—Measuring from Buildings—Operations Necessary to Produce Bills of Quantities—Taking Off—Abstracting—Billing—Measuring Up—Omissions—Example of Measuring Book—Collect the Work as much as possible—Situation of Work—Items Readily Found—Uniform Starting Point—Customary Commencement—Method to be Adopted—Different Methods exist 1

CHAPTER II.

EXCAVATOR.

Excavation for Basement—Over 6 Feet Deep—Wheeling over 20 Yards—Nature of Soil—Trenches—Allowance in—Example—Strutting—Piling—Driving—Ironwork to—Puddling—Drains

PAGE

—Wells and Cesspools—Steining to—Pumps to—Curbs to—Concrete—Less than 12 Inches Thick—Levelling to—To Spandrels of Arches—Table of Work—Abstracting—Billing .. 9

CHAPTER III.

BRICKLAYER.

Brickwork, How Valued—Measuring where Building Rectangular—Measuring Footings—Deductions—Example—Window Sills—Strings—Wood Plates—Circular Work—Chimney Breasts—Flues—Trimmers—Chimney Bars—Angle Chimneys—Ovens and Coppers—Firebricks and Lumps—Facings—Pointing—Arches and Vaulting—Gauged Arches—Axed Arches—Relieving Arches—Centering—Groined Arches—Circular Brickwork—Brickwork in Cement—Bricknogging—Brick Paving—Tile Paving—Rendering—Brick-on-Edge Coping—Pointing—Tile Creasing—Damp Course—Hoop-Iron Bond—Drains—Gully Traps—Cesspools—Abstracting for this Trade—Cube Brickwork—Table II.—Tiler:—How Measured—Allowances to be Made on Plain Tiling—Pantiling—Filletings—Hip Rafter, to measure—Table III. 12

CHAPTER IV.

SLATER AND SLATE MASON.

Measuring Slating—Addition to—Example of—Allowance for Hips and Valleys—Irregular Cutting—Deductions—Circular—Description of Slate Used—Sizes of Slates—which commonly Used—Fancy Slating—Ridges—How Set—Hips—Filletings—Damp Course—Creasing—Shelves—Work to—Cisterns—Sinks—Paving—Work to—Skirtings—Louvres—Labour on Surfaces—Chimney-Pieces—Fixing—Table IV.—Short Way of Finding Quantity of Slates 23

CHAPTER V.

MASON.

Difference of Opinion as to Measuring—Opinion of Masons—Confined to Description of Work—Want of Knowledge of Surveyor—Labour on Stonework—Methods of Measuring—How some Surveyors take—Small Jobs—Wide Tenders, Cause of—Rubble-Stone Walling—Measurement of, Depends on Locality—By Yard Super—By

PAGE

Perches—By Yard Cube—Deductions from—Extras to—Quoins—When of Brick—Brick Lining—Deductions from—Wrought Stonework—How to be Taken—Ashlar—Block-Stone—Irregular Shapes—Example of—Plain Work—Sunk Work—Circular—Circular Work—Circular Sunk Work—Circular Circular Work—Moulded Work—Reasons Why Definitions Given—Yorkshire Stone—Different Measurement from other Stone—Why—Hoisting and Setting—Over 6 Ft. in Length—Paving—Labour to—Landings—Labour to—Exceeding 6 In. Thickness—Stone over 30 Ft. Super—Hearths—Shelves—Curbs, Coping, &c.—Example of—Steps—Risers—Thresholds—Sills—Sink—Sink-Stones—Templates—Portland, Bath, and other Building Stone—How Measured—Labour to—Hoisting Over 40 Ft.—Half-Sawing—Explanation of—Abstracting of—Plain Work—Plain Face—Sunk Work—Moulded Work—Grooves, &c.—Chimney-Pieces—Paving—Landings—Numbers—Carving—Table V.—Example of Measuring—Spandrel Steps—Window Sill—Arch Stone—Coping—Window Head—Table Showing Contrast between English and Scotch Measurements of Stonework 27

CHAPTER VI.

CARPENTER.

Difference between Carpenters' and Joiners' Work—Allowance for Shrinkage—Dissection of Work—Example of—Open Roof—Labour to Joiners' Work, how Taken—Framed Timbers—Fixing—Floors—Bond Timber—Quarter Partitions—Joists—Double Framed Floors—Herring-bone Strutting—Deductions from Floors—Springer for Trimmer Arches—Girders—Oak Trusses—Bond Timber—Example of—Plates and Lintels—Roofs, Trusses to—King Post to—Example of—Ridges and Hips—Hips and Valleys—Cleats—Collars, &c.—Cuttings to Rafters—Ironwork to—Boarding or Battening—Eaves Boarding—Tilting Fillets—Deductions from Roofing—Additions to—Gutter Boards and Bearers—Example of—Drips and Cesspools to—Trap Doors—Linings to—Rim to—Fastenings to—Ceiling Joists—Rough Boarding—Gutters to Flats—Firrings to Flats—Rolls for Lead—Boarding—Battening to Walls—Sound-Boarding—Example of—Weather Boarding—Arris Guttering—Quarter Partitions—Oak Templates—Oak Curbs—Bracketing to Cornices—Example of—Cradling—Angle Brackets—Angle Staves—Centering—To Vaults—To Trimmers—To Windows—Turning Pieces—How to Measure—Labours to Carpenters' Work—Circular Timbers—Table of Work 50

CHAPTER VII.

JOINER AND IRONMONGER.

PAGE

Distinction between Carpenter and Joiner—Difference of Measurement—Order of Procedure—Floors—Deductions from—Borders to Hearths—Sinkings for Mats—Irregular-Shaped Room—Scribing to Walls—Skirtings—Grounds to—Angles, &c.—Moulding Plane—Sashes and Cased Frames—Example of—Sash Fastenings—Circular Sashes—Fixed Sashes—French Casements—Circular Heads to—Window Linings—Window Boards—Splayed Linings—Framed Grounds—Example of—Architraves—Window Backs—Example of—Capping to—Elbows—Boxing Shutters—Back Flaps—Back Linings—Shutter Boxings—Sliding Shutters—Doors—Ledged—With Gothic Heads—Sash—Example of—Classing Doors—Door Frames—Example of—Oak Sills—Jamb Linings—Example of—Framed Door Grounds—Example of—Architraves—Dados—Plinth to—Pilasters—Columns—Carving—Framed Partitions—Doors in—Cupboard Fronts—Spandrel Framing—Shop Fronts—Fascia to—Bracketing for Cornice—Putty Composition—Shop Shutters—Revolving Shutters—Work to—Staircases—Example of—Example of Housing—Strings—Linings to Well-Holes—Handrail—Iron Core—Newels—Iron Newels—Balusters—Ornamental Iron Balusters—Closet Fittings—Kitchen Dresser—Sinks—Order of Taking Labour—Oak or Mahogany—French Polishing—Ironmongery—Table of Work .. 63

CHAPTER VIII.

SMITH AND FOUNDER, GASFITTER AND BELLHANGER.

Customary Commencement—How Billed—How Measured—Wrought Iron—Chimney Bars—Flitches—Riveted Girder—Example of T and Cross Iron—Circular Columns—Hollow Columns—Bolts—Straps—Cast Iron—Ornamental Work—Gutters, &c.—Abstracting—Provision for—Table of Work—Gasfitter—Piping—Gaseliers—Sun-Burners—Fees to Company—Cutting away for—Table of Work—Bellhanger—Tubes—Pulls, &c.—Table of Work—Electric Bells 91

CHAPTER IX.

PLASTERER.

Commencement—External Work—Deductions from—Additions to—Labour—Reveals—Cornices, Architraves, &c.—Enrichments—

PAGE

Beads and Quirks—Columns, Pilasters, &c.—Fluting—Strings, &c. — Balusters — Chimney-Pots — Rendering — Inside Work — Ceilings — Example of — Deductions — Additions — Lath and Plaster — Whitening — Extra to — Panels — Centre Flowers — Soffits—Cornices—Example of —Enrichments to—Friezes—Rendering to Walls—Angles—Beads and Quirks—Circular Lathing and Plastering to Partitions—Mouldings and Architraves—Cement Skirtings — Cement Floors — Cement Hearths — Limewhiting, Colouring, Distempering, &c.—Table of Work 98

CHAPTER X.

PLUMBER AND ZINC-WORKER.

Easy to Measure—Difficult to Price—Milled or Sheet Lead—Where to Commence—Abstracting—Flats—Example of—Drips—Ends to Rolls — Flashings to — Gutters — Cesspools — Coverings to Dormers, Cheeks, Aprons, &c. — Flashings — Pointing to — Abstracting — Finials — Cisterns — Sinks — Nailing — Pipes — Brasswork to — W. C. Apparatus — Soil Pipes — Service Boxes — Pumps — Lavatories and Urinals — Table of Work — Zinc-worker — Different from Leadwork — Gutters — Rain-Water Pipes — Heads, &c. — Tallboys — Ventilators — Skylights—Metal Lights—Speaking Pipes—Table of Work 106

CHAPTER XI.

PAINTER, Etc.

Commencement—Staircase—Some Surveyors allow for—Cut In—How Billed—Sashes and Frames—Casement Frames—Stone Sills—Plinths, Cornices, &c.—Guttering—Rain-Water Pipes—Cresting—Railings—Gates—Balconies, &c.—Door-Knockers, &c. —Inside Work—How to Measure—Windows—Window Backs—Panels—Boxing Shutters—Skirtings—Dados—Doors and Linings —Strings—Balusters, Handrails, and Newels—Knotting and Stopping—Mouldings Cut In—Common Colours—Grained Work —Staining—Table of Work—French Polisher—Writer—Gilder —Table of Work 113

CHAPTER XII.

GLAZIER.

Work, How Measured—Billed—Semicircular Sheets—Bent Glass—Coloured or Embossed Glass—Cutting to Segmental Heads—Lead Lights—Tracery—Glass Tiles and Slates—Table of Work 119

CHAPTER XIII.

PAPERHANGER.

PAGE

Method of Finding Number of Pieces of Paper—Preparing Walls—Borders and Hangings—Table of Work 121

CHAPTER XIV.

ABSTRACTING AND BILLING.

Usually Done by Juniors—Order of Items in Abstract—Directions as to Abstracting—Cubical Items—Supers—Running—Space—Bricklayer — Carpenter and Joiner — Billing — Description of Materials — Conditions of Contract — Insurance — Maintaining Works—Surveyors' Charges—Cost of Lithography 122

CHAPTER XV.

REPAIRS.

Difficulty of Dealing with—Practice of Lumping—Piecing Stones—Taking Down Walls—Renewal of Joints—Raking out—Pointing—Decayed Stone—Drains and Traps—Chimneys—Stove Backs—Paintwork—Hacking Out—Iron Fencing—Pavement—Table of Reparations—Matching Paper—Day Work 125

CHAPTER XVI.

ABBREVIATIONS.

Adopted commonly by the Profession—In some Cases Unadvisable—Vary—Same System throughout the Profession—Classification of—More used in Joiner—Table of 131

CHAPTER XVII.

RÉSUMÉ AND CONCLUSION.

Recapitulation — Attention drawn to the Subject — Assistance to Students — Uniformity to be Desired — Reference Work — Tabulated Form — Assistance to Surveyor — System — Want of Care—Instance of Omissions—Design—Quantities Safer—Pay Well 134

LIST OF ILLUSTRATIONS.

		PAGE
FIG.	1.—Plan showing measurement of foundations, &c., of rectangular building	13
„	2.—Section of footings to a 2-brick wall	13
„	3.—Section of footings to a 2½-brick wall	13
„	4.—Plan of window opening in a 1½-brick wall	13
„	5.—Plan of angle fire-place	15
„	6.—Elevation of opening showing measurement of gauged arch	16
„	7.—Plan of roof showing method of obtaining the length of hip or valley	22
„	8.—Sketch showing method of cutting irregular blocks out of one stone	31
„	9.—Sketch exemplifying "sunk work circular"	32
„	10.—Isometrical view of a stone landing showing joint	33
„	11.—Section of stone coping	35
„	12.—Plan of a "rebate"	38
„	13.—Elevation of spandrel steps	42
„	14.—Section of window sill	43
„	15.—Sketch of arch stone with sunk joint	44
„	16.—Section of stone cornice	45
„	17.—Elevation and section of ornamental stone window head	46
„	18.—Scarf in timber	51
„	19.—Sketch of flitch girder	52
„	20.—Elevation of king post	54
„	21.—Sketch of roof with dripping eaves	55
„	22.—Tilting fillet	55
„	23.—Valley gutter boards and bearers	56
„	24.—Wall gutter boards and bearers	56
„	25.—Sound-boarding, section of	58
„	26.—Sketch showing cradling or entablature for cornices	59
„	27.—Sketch of moulded skirting	65
„	28.—Plan of architrave	69
„	29.—Sketch of door with splayed top rail	71

PAGE
FIG. 30.—Sketch of pilaster 76
„ 31.—Elevation of spandrel framing under stairs 77
„ 32.—Sketch of staircase 79
„ 33.—Plan showing winders 79
„ 34.—Sketch showing "housings" in strings 81
„ 35.—Sketch of handrail 82
„ 36.—Sketch of newel, balusters, &c. 83
„ 37.—Sketch of seat and riser 84
„ 38.—Section of riveted girder 92
„ 39.—Section of tee iron 93
„ 40.—Section of cross iron 93
„ 41.—Section of roll in lead 107
„ 42.—Sketch of spandrel 120

QUANTITIES.

CHAPTER I.

INTRODUCTION — BUILDERS' QUANTITIES — WORKS OF REFERENCE — LETTERS RECEIVED FROM ALL PARTS — PRESENT WORK AS ARTICLES — WAY RECEIVED — FORMER WORKS INADEQUATE — PROGRESS OF PROFESSIONS — REVOLUTION OF SYSTEMS — OLD METHODS SUPERSEDED — HARD WORK NECESSARY FOR SUCCESS — SUBJECT CONFINED TO QUANTITIES AND VALUATION — SURVEYORS' HANDBOOK — INSTRUCTION IN CONDENSED FORM — USEFUL AS REFERENCE — CONDENSED AS MUCH AS POSSIBLE — GLOSSARY OF TERMS — ITEMS SCHEDULED — BASED ON PRACTICAL EXPERIENCE — ABLEST WRITERS — RULES — METROPOLITAN SURVEYORS HAVE GREATER EXPERIENCE — UNIFORMITY OF MEASUREMENT — DIFFERENCES AMONG SURVEYORS IN THEIR METHODS — WHENCE DIFFERENCES ARISE — MEASUREMENT NOT CONFINED TO SURVEYORS — BUILDERS TAKE OFF QUANTITIES — NOT SO MINUTELY — IMPROPER METHODS — PROVISIONS FOR DISCREPANCIES — IGNORANCE OF TECHNICAL TERMS — CAUSE OF WIDE TENDERING — BUILDERS KNOWING SURVEYORS HAVE ADVANTAGE — EXAMPLE OF RE-MEASURING REFUSED — DEDUCTION MADE BY SOME BUILDERS — ESSENTIAL POINTS TO BE NOTED BEFORE PROCEEDING — KNOWLEDGE OF ART OF BUILDING — RULES OF MENSURATION — TACT AND PATIENCE — ACCURACY AND ENERGY — MORE CARE REQUIRED IN MEASURING FROM DRAWING THAN FROM BUILDINGS — MEASURING FROM BUILDINGS — OPERATIONS NECESSARY TO PRODUCE BILLS OF QUANTITIES — TAKING OFF — ABSTRACTING BILLING — MEASURING UP — OMISSIONS — EXAMPLE OF MEASURING BOOK — COLLECT THE WORK AS MUCH AS POSSIBLE — SITUATION OF WORK — ITEMS READILY FOUND — UNIFORM STARTING POINT — CUSTOMARY COMMENCEMENT — METHOD TO BE ADOPTED — DIFFERENT METHODS EXIST.

I TRUST no apology is necessary for introducing to the professional world the subject of builders' quantities. That it has already been treated of I readily admit, and by many authors, and indeed what subject has not? but from some cause

or other, the works published on it have failed to attain to that standard of excellence which is necessary to entitle them to be considered "*Works of Reference.*" I am the more convinced of this from the numerous letters I received from all parts of the country, during the period the series of articles which form a portion of the present work were appearing in the 'Building News'; and from the treatment it received at the hands of its numerous readers and correspondents; clearly proving to my mind, that the works already published must, from some cause or other, have failed to impart that knowledge to the uninitiated for whose benefit they were doubtless written, or perhaps their authors had failed to make that advancement in the subjects they treated of, which is so essential in this age of progress.

Tempora mutantur, et nos mutamus in illis. This motto may also be applied to the several vocations in life. Look at whatever profession you may, and you will find that the system of progress has made repeated changes; take the legal profession; new Acts of Parliament supply the place of old, or the medical profession, where late scientific discoveries have tended to revolutionize the old system. And is it not so with our own profession, where the slow laborious methods followed by the old class of surveyors have been superseded by the more advanced and scientific methods adopted by their younger brethren of the present time? It is, therefore, necessary to any individual who wishes to attain to eminence in any profession to work continuously and hard, and more than moderate attention is required to ensure even a *modicum* of success.

It is not intended in the present work to enter into the subject of design or taste, or even to mention them, as the desire of the author is to exclusively confine himself to the subject of quantities and their valuation, and he hopes that his endeavours in this respect will meet with the success he desires, and that this handbook may be considered the surveyors' *vade mecum.* Should failure await these intentions, at least instruction will be given in a condensed form in the same manner (as far as the subject permits) as in his works on 'Dilapidations,' 'Compensations,' and 'Arbitrations,' useful alike in teaching

the young practitioner and, it is hoped, as a reference to the more mature.

In the following chapters, whilst entering as fully into the subjects as they may demand, I have condensed them as much as possible, so as to do away with any unnecessary reading, which, whilst tiring to the student, imparts but little or no information. I have, to save time as much as possible, given a most complete index, which, I believe, will be found of great service in enabling readers to find, with a single reference, whatever they may require.

The various items are scheduled under their several trades, and in showing how the works are measured I may observe that I have based my operations upon my own practical experience, and upon conclusions drawn from the works of the ablest writers on the subject. The rules laid down will be found to be those adopted by the generality of metropolitan surveyors, as their experience must necessarily be larger than that of our country brethren, and more diversified and particularized. With this object in view, I hope to fully elucidate the subject, so that an uniformity of measurement may be adopted throughout the kingdom. At present many differences exist amongst quantity surveyors in their methods of measurement of the various classes of work. Some of these differences arise from the fact of surveyors adopting their own peculiar methods, and some again from a lack of experience and an imperfect knowledge of the science. It must also be borne in mind that the admeasurement of artificers' work is not confined to the profession of quantity surveyor. Many builders in tendering for works where the quantities are not supplied, take off their own rather than incur an expense, by employing a surveyor, in the event of their tender not being accepted. Builders do not, as a rule, enter so minutely into the subject as surveyors, they measure the work more fully, which allows for omissions. I regret that this is a plan adopted by many so-called surveyors who, from a lack of knowledge or some other cause, measure their work *full* to give a margin of allowances for omissions in the description of labour, which they intentionally omit or are unable to measure (and this is particularly noticeable in masons'

work, where I have seen the cube stone described, including all labour, in the one item); or again, but in rarer cases, where all is properly described with respect to items, certain additions are made to provide against any discrepancy (if any) which may have occurred in the hurry of taking off. It is a well-known fact that many builders (so-called practical men) do not know the actual technical terms used to express certain classes of work, and consequently some of their prices are somewhat erratic. This accounts to a slight degree for the variations in tendering we so often meet with. And as a proof that surveyors themselves are not strictly accurate, or that their methods differ somehow from each other (to put the matter more pleasantly), it is found that the builders who know them well, in tendering from their quantities for works, can generally withstand any outsider who may be unacquainted with them. This to a certain extent arises from their having the advantage of knowing, from experience, the allowance which they may make for excess of quantities. I remember an instance of a warehouse being built in the City: the house was built one foot longer than shown upon the drawings from which the quantities were taken. The builders, a well-known firm, naturally claimed for the additional length, but strange to say forewent their claim when the architect declined to pay the extra alone, but offered to measure up the *entire* building and pay them for any excess over the quantities owing to the additional length, and also pay the commission for measuring up provided only they allowed him for any excess, should there be any, in the existing quantities on the work actually executed, clearly proving that they must have been measured *too* full from the drawings, and that the builders had already ascertained these facts. In some cases the writer has known builders to price the quantities, and then deduct a certain percentage, taking it for granted that the quantities are full.

In considering the subject of quantities, let us briefly ascertain the essential points to be noted by the student as qualifications which he must possess before he is properly qualified to carry out the instructions contained in the following chapters. They may be summarized as follows:—

Firstly. A thorough knowledge of the art of building.

Secondly. An acquaintance with the ordinary rules of mensuration.

Thirdly. A certain amount of tact and patience to grasp the subject so as to be able to apply the admeasurement to any description of works.

Fourthly. Accuracy and energy.

With respect to the first of these items, it is absolutely necessary that the student should be thoroughly acquainted with the building trades, and that such acquaintance to be of effect should be practical and not simply theoretical. Unless this is the case, he will find himself beset with difficulties, which, if not insurmountable, will greatly retard the successful accomplishment of his task. This will more clearly be presented to his mind when measuring from working drawings, where much more care and knowledge are required than where measuring from the building. The other qualifications are just as essential to enable the student to become a quantity surveyor as that of which I have just spoken; the second is what most youths of an ordinary amount of intelligence possess; but the last two items are worthy of especial attention by all those who wish to attain to the goal of success.

In measuring from the building the mode of procedure is the same as where measuring from the drawings, the only difference being, as I have just said, that the latter requires a little more care.

The operations necessary to produce the schedule, or bills of quantities, from which builders make up their tenders, are: *taking off*, by which we mean the measurement or taking off of the several items and dimensions from the drawings; *abstracting*, that is, arranging or apportioning the several works from the dimensions, so as to arrive at the totals of each; and *billing*, that is, bringing the quantities with their descriptions from the abstract and arranging them in the form of a bill, and it is only the bills that are supplied to the various builders to enable them to prepare their estimates. Another operation is necessary where the work has not been carried out in its entirety according to the drawings and specifications from

which the bills of quantities were prepared, viz. *measuring up*, by which is meant taking the dimensions from the building, and *extras* are treated in this way. *Omissions* are works which, whilst included in the bills of quantities, have not been executed, and consequently have to be deducted.

The dimensions are generally taken off and entered in a measuring book, or on paper ruled for the purpose; see specimen on next page.

The dimensions when taken are placed in the column which I mark for reference, D, the adjoining column to the right, A, being for the cubical contents, superficial area, or as the case may be, of the dimensions. To the left of the dimension column, D, is placed the number of times any particular item may occur (when more than once). Where there are several dimensions of the same character, as, for example, walls of the same height and thickness, it is undesirable to make a separate entry for each, and they are *collected* at the right-hand side of the book, a column being sometimes, though seldom (it being unnecessary), ruled for this purpose, and technically known as *waste* (see item No. 2, how obtained). The several dimensions are then cast up, and the sum, or total, placed as shown in the column D, as a collection of works of the same height and description. In the illustration given we have a rectangular building, 30 feet × 20 feet outside dimensions of walls, with all walls of the same height and thickness; they are therefore added together, and the one dimension of the total length saves the trouble of making two entries of the same kind.* It is always advisable to *collect* the work as much as possible, as it materially shortens the labour; but care must be taken to state, in addition to the description of the work, the particular situation of it, as by this means the surveyor can the more readily find a dimension at any future time, should it be required.

In taking off, always make an uniform starting point, and adopt a general course throughout. By this means it will be much easier to find any required dimension hereafter. It is

* In Chapter II. I explain the method of obtaining the dimensions in the example here given.

SPECIMEN.

	D	A	
	32·2		
	22·2		
	1·6	1070·0	Dig wheel and deposit to surface
			20·0 (width of building)
			2/1·2 = 2·4 (thickness of outside walls)
			17·8 (net length of end walls)
			30·0 front wall (gross)
			17·8 end wall (net)
			2/ 47·8
			95·4 total length of four walls
	95·4		
	4·0		
	2·6	953·4	Ditto to trenches part return wheel fill in tram (walls collected)
	95·4		
	4·0		
	1·6	572·0	Concrete as described
	95·4		
	9	71·6	2½ B. footings
	95·4		
	12·0	1144·0	1½ B. wall to top of plate (ground floor)
	95·4		
	18·0	1716·0	1 B. add to roof plate
	3·6		
	7·0	24·6	1 B. ddt. entrance door
	4·3		
	7·3	31·0	½ „ „
3	3·0		
	6·0	54·0	½ B. ddt. windows (ground floor)
3	3·9		
	6·3	70·4	1 „ „ „
2/3	2·6		
	5·6	82·6	½ „ (1st and 2nd floor)
2/3	3·3		
	5·9	112·2	½ „ „ „ „

customary to commence at the left-hand corner of the building, and from thence work round to the right hand. Also adopt one method of taking the dimensions, thus: In internal dimensions in every trade, take floor by floor, commencing at the left as before. Take the length first; secondly, the breadth or width; and lastly, the depth or height.

In the following chapters it is intended firstly, to show how the several works are measured, and at the conclusion of each trade to give the order of abstracting and bring the quantities into bill. Many surveyors have their own method of abstracting, but I think it preferable to have only one general plan throughout the profession.

CHAPTER II.

EXCAVATOR.

EXCAVATION FOR BASEMENT—OVER 6 FEET DEEP—WHEELING OVER 20 YARDS—NATURE OF SOIL—TRENCHES—ALLOWANCE IN—EXAMPLE—STRUTTING—PILING—DRIVING—IRONWORK TO—PUDDLING—DRAINS—WELLS AND CESSPOOLS—STEINING TO—PUMPS TO—CURBS TO—CONCRETE—LESS THAN 12 INCHES THICK—LEVELLING TO—TO SPANDRELS OF ARCHES—TABLE OF WORK—ABSTRACTING—BILLING.

COMMENCE with the excavation of the surface where necessary, as for basement or sunk stories, taking the net dimensions of length, breadth, and depth of the digging required. Where the excavation does not exceed 6 feet in depth, it is described as digging and throwing out only, but where beyond that the depth must be stated; in addition, specify whether the earth is to be wheeled and spread, or carted away. If wheeled above 20 yards, how far, and if carted away, it is advisable also to state the distance; though this is seldom done, the cost varying according to the distance. Give the nature of the soil, as the labour is regulated by it.

Trenches must be measured and kept separate from the general excavation, and described as "digging to trenches, part filled-in and rammed," the filling-in and ramming taking place after the foundations are in. Some surveyors, however, make a separate item of these latter, in which case the item for the digging is placed with the general excavation. Where there is no concrete, an *allowance* of 6 inches on either side of the bottom course of footings is made, to give the bricklayers room to work in; but where concrete is provided to be used in foundations, allow for only the width of the concrete. Thus, where bottom of footing is three bricks, or 2 feet 3 inches wide, and no concrete provided to be placed under, the width taken for excavation would be 3 feet 3 inches.

Strutting.—When the excavation is deep, and the soil loose,

it will require to be strutted, to prevent the ground from falling in. This is measured at per yard run (see Table I.), giving the depth and width of the trench, and is described as "strutting and planking to perpendicular excavation."

Piling.—Where piling is used, it will be necessary to state the number of the piles, with the length in feet, and scantling of each. Then measure the quantity of planking required to be spiked to the fan of the piles. For the labour of driving, take the number, and state the distance each is driven into the ground; also number the ringing, pointing, and shoeing, giving the weight of the ironwork.

Puddling.—In measuring clay puddling over vaults, arches, &c., take the length by the width, and describe the thickness.

Drains.—In measuring trenches for drains, &c., state the average depth, and the size of the drain.

Wells and Cesspools.—In measuring wells and cesspools you will have to state the depth and nature of soil, because as the depth becomes greater, the price per yard will proportionally increase.

Where the wells are steined, they are usually numbered, and described as "digging and steining to well," including all gear, tackle, and other materials necessary for its execution, stating the depth and the mean diameter (that is, in clear of the steining), and the class of steining required, whether dry or otherwise. Remember that curbs and after fittings, as pumps and apparatus, are to be taken in addition to the foregoing.

Concrete.—In measuring concrete foundations, the net dimensions are to be taken, and the description given of its composition and the method of throwing in, whether from a stage or otherwise, which will be found in the specification.

Concrete of a less thickness than 12 inches, or where under pavings, &c., is taken at per yard superficial (see Table I.), stating the thickness and description as before; and where extra labour in levelling the surface is required (as to receive paving), it must be so stated.

Where it is filled-in over arches, it is measured at per yard cube, but it must be described as filling-in to spandrels of arches, as the case may be.

I now proceed to give, in tabular form, the mode of measuring the several items in this trade. To economize space as much as possible, I make each table answer two purposes, namely, it gives the order of taking the trade, and also the method of measurement. It will be found very useful as a reference, to see that all the items of the trade are taken, so that nothing may be omitted.

TABLE I.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

DESCRIPTION OF WORK.	HOW MEASURED.
Digging and throwing out	At per yard cube.
„ wheeling and spreading	„
„ and carting away	„
„ to trenches part filled-in and rammed	„
„ to wells and cesspools	„
Concrete in foundations	„
Clay puddling	At per yard super.
Concrete under 12 inches thick	„
Trenches for drains	At per yard run.
Strutting and planking to sides of perpendicular excavation	„
Steining to wells	At per number.

Abstracting.—In abstracting excavators' work, very little or no instruction is necessary, the number of items being so limited. Care must be taken to keep the different works separate; a column or two being allotted to each, according to the size and nature of the job.

In *Billing*, always take the "cubes" first; secondly, the "supers"; thirdly, the "runs"; and lastly, the "numbers." *

* The order in which the various articles are placed in the Table it is advisable to follow in respect to this trade and all the trades that follow.

CHAPTER III.

BRICKLAYER.

BRICKWORK, HOW VALUED — MEASURING WHERE BUILDING RECTANGULAR — MEASURING FOOTINGS' DEDUCTIONS — EXAMPLE — WINDOW SILLS—STRINGS—WOOD PLATES—CIRCULAR WORK—CHIMNEY BREASTS — FLUES — TRIMMERS — CHIMNEY BARS — ANGLE CHIMNEYS — OVENS AND COPPERS — FIREBRICKS AND LUMPS — FACINGS—POINTING—ARCHES AND VAULTING—GAUGED ARCHES — AXED ARCHES — RELIEVING ARCHES — CENTERING—GROINED ARCHES—CIRCULAR BRICKWORK—BRICKWORK IN CEMENT — BRICKNOGGING—BRICK PAVING—TILE PAVING—RENDERING — BRICK-ON-EDGE COPING — POINTING — TILE CREASING — DAMP COURSE—HOOP-IRON BOND—DRAINS—GULLY TRAPS—CESSPOOLS—ABSTRACTING FOR THIS TRADE—CUBE BRICKWORK —TABLE II.—TILES:—HOW MEASURED—ALLOWANCES TO BE MADE ON PLAIN TILING — PANTILING — FILLETINGS — HIP RAFTER, TO MEASURE—TABLE III.

BRICKWORK is usually valued at per rod of 272 superficial feet, $1\frac{1}{2}$ brick or $13\frac{1}{2}$ inches thick, all work of whatever thickness being reduced to this standard. Should the work, however, be under this thickness, it must be kept separate from the general work, and described according to its nature; also where the joints have to be stuck on both sides, as, for example, in boundary walls.

In measuring walls take the length by the height, and describe the thickness. The several thicknesses are reduced to the standard in the abstract, as will be shown hereafter. Where the building is rectangular, take the external face of two walls, and the internal face of the outer two, for the length see Fig. 1. Some surveyors keep these same dimensions for the concrete, footings, and even digging to trenches, as in the latter cases the altered lengths, when added together, amount to the same thing, the average being the same.

Commence with the foundations, taking from the base to the

top for the height of the footings, and average them for the thickness. In the two following examples, Figs. 2 and 3,

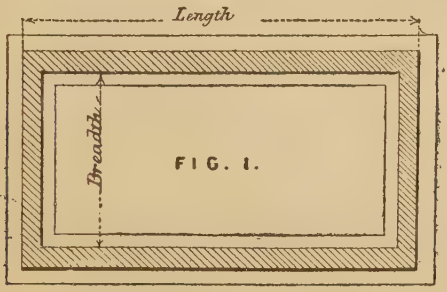


FIG. 1.

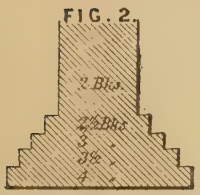


FIG. 2.

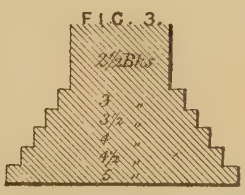


FIG. 3.

the average would be respectively $3\frac{1}{4}$ bricks and 4 bricks. Taking the former, and supposing the wall to be 50 feet long, we should have

50·0 1·0	50·0	$3\frac{1}{4}$ brick footing.

After the footings, take the wall up to under side of ground-floor joists, and so on, floor by floor, or as high as the wall continues of the same thickness, taking care to make the several additions and deductions as they occur. A little care is neces-

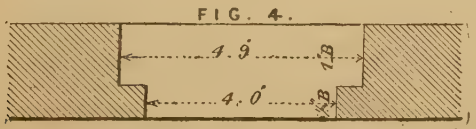


FIG. 4.

sary when making deductions. In deducting openings to windows or doors, where there is a reveal, as Fig. 4, two dimensions will be necessary, the deduction for the $\frac{1}{2}$ brick being

less than that for the 1 brick; thus, supposing the height to be 6 feet,

4·0 6·0	24·0	½ B. ddt. window.
		4·0 2 reveals 9 4·9 6·0 1 reveal 4½ 6·4½
4·9 6·4½	30·3	1 B. ddt. window.

And in the case of windows, should there be any deduction for window back, it will have to be taken in addition to the foregoing.

No deduction is made for window sills, or strings under 6 inches in height, nor for any woodwork under that depth; and where wall plates are placed above the walls, 2 inches is added to the wall, and charged as brickwork to pay for the cost of bedding. Circular and semicircular works are indicated as such in the dimension book, and the diameter figured inside; thus where the item is a cube, the depth or height is placed under: thus

Chimney-breasts and flues are measured similarly to the other work, taking first the footings, and so on, floor by floor, stating the thickness beyond the wall, and deducting only for the openings for fire-places, the flues being measured in, as if solid, and afterwards numbered for "coring" and "pargetting."

It is also advisable at the time of measuring the chimney breasts to take the trimmers, which are measured and valued by the foot superficial, taking the length by the breadth. They are described as "half-brick trimmers in cement," the centering

being measured at the same time, and afterwards abstracted in the carpenter. Take also the wrought-iron chimney bars to carry arch over opening at per foot run, according to specification, generally 18 inches longer than the opening. This is afterwards abstracted in the smith's bill, and valued at per weight. Angle chimneys (Fig. 5) are measured as solid, and

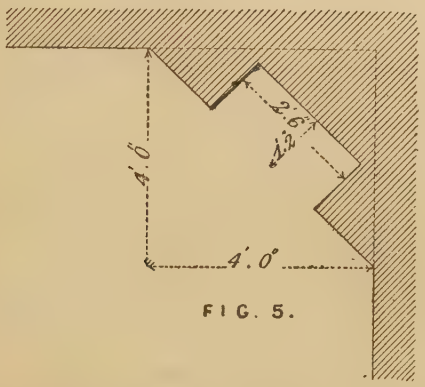


FIG. 5.

afterwards reduced to ordinary standard; thus, presuming the height to be 12 feet, we should have

½	12·0		
	4·0		
	4·0	96·0	Cube brickwork in angle breast.
	2·6	8·9	1½ brick ddt. opening.
	3·6		

Ovens and coppers are measured as solid brickwork, deductions being made for the ash-holes only.

Firebricks and lumps are charged as "extra."

Facings.—When the brickwork is faced with a superior class brick to that used in the general work, that is charged as "extra only" to the brickwork, and measured and valued at per foot superficial as "extra only to picked stock facing," white Suffolk facing, or as the case may be, including pointing; and if the reveals to windows and doors be not plastered, they will have

to be added and included in the facing; also add as much of the return walls as show the facing bricks. Make all the deductions as for ordinary brickwork, including the arches, which are charged separately.

Pointing is measured sometimes by the foot super, and sometimes by the yard, and sometimes by the square of 100 feet superficial. The former, however, is the more ordinary way of measuring it, and I think the best, and have therefore so placed it in Table II.

Cuttings.—Cuttings are measured at per foot super, when over 6 inches wide; under that, at per foot run. It will also be necessary to state the nature of the cutting, whether rough cutting, as over relieving arches, and where not seen, if fair cutting, cutting to skewbacks, &c. Bird's-mouth cuttings and cutting to squint quoins are measured at per foot run, and described according to the nature of the work, whether "rough" or "fair."

Arches and Vaulting.—In their admeasurement, take the length by the mean girth between the *intrados* and the *extrados;* and state the thickness. This is afterwards reduced to the standard rod, and valued accordingly.

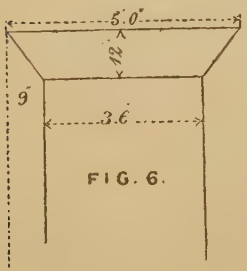


FIG. 6.

Gauged Arches, Axed Arches, &c., are measured by taking the width of the opening between the reveals, and add to the dimension the projection of one skewback for the length, then take the height thus, referring to Fig. 6.

	′	″
Opening, ...	3	6
1 Skewback ..		9
	4	3

4 · 3		
1 · 0	4 · 3.	Extra to gauged arch in yellow malms, set in putty (or as the case may be).
3 · 6		
9	2 · 7.	Add soffit.
	6 · 10	

It will be necessary to deduct these arches from the "facings."

Relieving Arches are charged as extra to the ordinary brickwork, they having been taken and included in the ordinary walling. They are afterwards averaged (that is, the openings) and the width of soffit stated thus:—

No. 24.—Extra only to relieving arches in cement, in three half-brick rims to 4-ft. openings (average), and 9 in. soffit.

Centering, it will be seen by the Table, is taken at per foot super, measuring the soffit of the arch. The turning pieces are measured at per foot run, stating the length and width of soffit only.

It is also advisable to measure the cuttings after the arches for the sake of convenience: thus, in the example just given, the cutting would be taken and described as:—

2	1·2 7	1·4	Fair cut skewbacks.

If the arch be segmental, it will be necessary to describe the cutting as cutting to face bricks to fit segmental arches, or as circular, fair cutting where the arch is semicircular, greater labour being entailed where the cutting is circular. It should be particularly observed that all cuttings should be described as they are executed.

Groined arches are measured the same as ordinary arches. The cutting to groin being, however, taken separately at per foot run.

Circular Brickwork must be kept separate from the straight, and described accordingly. If under 20 feet diameter, it is customary to state the radius. Some surveyors allow 1½ times the straight to meet the additional labour, without describing the work as circular; but this should not be done, as all work should be described in the bill according to the nature of its execution, whether circular or straight. It is always understood to be straight unless otherwise specified.

Brickwork in Cement is measured with the ordinary brickwork in mortar, and an extra charge made to meet the increased price

for the cement. It is, therefore, measured first with the brickwork in mortar; and the same item appears a second time as *extra only* in cement. Items, however, other than the plain brickwork are specified, without the extra, as trimmer arches in cement, &c.

It may be as well to observe here that all brickwork is understood to be executed in mortar unless specified to the contrary.

The measurement of *bricknogging* includes the timbers, but there must be deductions therefrom for the opening where they occur.

Brick Paving.—State whether brick on edge or brick flat, also whether in cement or mortar, &c., also the quality of the bricks.

Tile paving requires no explanation; the Table showing all that is necessary.

Rendering in cement by bricklayer is sometimes measured by the yard, and sometimes by the foot superficial, the former, however, is more generally adopted; and therefore I have so placed it in the Table. It is described as "rendering in cement from the trowel."

Brick-on-edge Coping.—Measured, as will be seen, at per foot run, stating thickness of wall, and described as "extra only" to brick on edge in cement, it having been firstly measured in with the brickwork in mortar.

Pointing is taken and measured similarly to "facings." The description is taken from specification, as tuck pointing, &c., and the nature of the work should also be stated, whether to old or new fronts, and if scaffolding is required:—

In measuring *tile creasing*, state if bedded in cement or mortar, and if laid double.

In taking slate or other *damp course*, it is necessary to give exact description.

Hoop-iron bond is taken at per foot run, giving size and description, whether tarred and sanded, or as the case may be. It is afterwards abstracted, brought into the smith's bill, and charged at per weight.

Drains require to be described. Also state whether jointed in cement or mortar, and the net diameter of the pipes. Number

the bends and junctions which are charged as "extra," the length of the same having been taken with the ordinary pipes. Also state whether single or double junctions; and in stating the size it is advisable to give the dimensions of both of the pipes it is intended to unite, as 4 inch into 6 inch (or as the case may be). If barrel drains, it is best to measure them at per foot run, stating net diameter and number of half-bricks in thicknesses of the ring, including centering, &c.

Gully traps are numbered.

Cesspools, it will be seen, are numbered, giving the depth, and diameter, and description of method of finishing. Number the drain pipes discharging into same, and describe as "extra to making good to drain pipes."

Abstracting.—In abstracting this trade, it is necessary to allot a certain number of columns to the several descriptions of work, as recommended in the "Excavator"; but great care and circumspection will be necessary in the uninitiated tc obtain a proper arrangement. It is, therefore, advisable to enter the several items as widely apart as possible, leaving, of course, greater space for those that occur the more frequently.

In an ordinary job, one column will suffice for cube brickwork, one for one brick and another for one and a half brick, with an additional column between them for the deductions. Deductions are made where practicable on the dimension paper (as, for example, where the deduction occurs after the addition), so saving unnecessary labour.

The next three or four columns will be taken up with "extras,"—as brickwork in cement, facing bricks, arches, and the other superficial quantities.

We then allot the remainder to the "runs," or lineal dimensions, leaving two or three columns for the numbers, and any remarks.

With respect to the brickwork, as the standard adopted consists of 272 feet superficial of 1½ brick thick, all brickwork will have to be reduced to this thickness.

This is accomplished in the first place by reducing the brickwork, where above 1½ brick, to either 1 brick or 1½ brick, whichever is the simplest, and abstracting it accordingly.

Then, after it is all abstracted, bring the sum of the 1 brick into 1½ brick by multiplying it by ⅔rds.

If we take the case already given with respect to footings, we have 50 feet of 3¼ brick, which can either be reduced to 162 feet 6 inches 1 brick, or 108 feet 4 inches of 1½ brick; but when the latter can be as easily done as the former, it is advisable to do it. It will be necessary to divide some dimensions between the two: thus, supposing it to be 2½ bricks, we should have 50 feet of 1-inch brick and 50 of 1½ brick in the abstracting, this being the easier method of reducing the quantity.

Cube brickwork is abstracted as such. It is afterwards reduced to the standard of 1½ brick by multiplying by 8, and dividing by 9.

TABLE II.

This Table has a double use; it shows the order of taking the items of this Trade, and the method of Measurement.

DESCRIPTION OF WORK.	HOW MEASURED.
Stock brickwork in mortar	At per rod reduced.
„ to fence walls, or walls under 1½ brick thick	„
„ circular	„
Brickwork in cement	„
Facings (extra only to), stating whether picked stock, yellow malms, white Suffolks, or as the case may be, always placing the inferior quality first; and whether including pointing	At per foot super.
Gauged and axed arches (extra only to)	„
Rough cutting	„
Fair cutting	„
Circular fair cutting	„
And all cuttings over 6 inches wide	„
Pointing	„
Half-brick walls in cement	„
Trimmer arches in cement	„
Damp course	„
Bricknogging, flat or on edge	At per yard super.
Brick paving do.	„
Tile paving	„
Rendering in cement	„
Cutting to bird's-mouth* Squint coins	At per foot run.

* Where the return wall of a building is otherwise than at right angles with the front, the angle bricks will require cutting to the rake of the return wall. That cutting which is made to the inside angle is called cutting to bird's-mouth, and that to the outside angle as cutting to squint quoins.

Description of Work.	How Measured.
Chamfers	At per foot run.
Splays under 6 in. wide	,,
Beads and quirks	,,
Chases in brickwork	,,
Pointing to flashings	,,
Lime and hair or cement filletings	,,
Brick-on-edge coping	,,
Tile creasing	,,
Fascias	,,
Cornices	,,
Glazed stoneware drain pipe, according to size and description	,,
Bends and elbows—extra to	At per number.
Single and double junctions—extra to	,,
Brick relieving arches in cement (14 in.) soffit to (4 ft.) average openings—extra to	,,
Frames, bedded and pointed	,,
Flues, cored and pargetted	,,
Setting to stoves	,,
,, ,, range	,,
Chimney pots and setting	,,
Setting chimney-pieces	,,
Building-in ventilators and air bricks	,,
Ends of sills made good	,,
,, rain-water pipes made good to drain	,,
,, timbers cut and pinned	,,
Stops to chamfer, mouldings, &c.	,,
Returns ,, ,,	,,
Mitres ,, ,,	,,
Angles ,, ,,	,,

[Some take the last four items under the items to which they refer, but I think they are more usually taken in this order.]

Cesspools, with description	At per number.

Tiler.

In measuring tiling, whether plain, pan, or ornamental, take the extreme length of eaves from out to out, by the breadth from eaves to ridge, measuring the latter from the section.

Twice this item, if the building is rectangular, will give the superficial area of tiling for the roof.

If the building is hipped at both or at one end, the dimensions will still be taken as above from out to out, as whether the roof be hipped or gabled, the superficial area will be about the same; and, of course, this plan materially shortens the labour.

The following allowances in the measurement of plain and pan tiling must be made upon the net superficial area of the tiling.

In Plain Tiling.

	Inches.
For eaves	4 extra.
„ dripping ditto	6 „
„ cutting hips, &c.	3 „
„ valleys	12 „

In Pantiling.

For cutting to hips, splays, &c., at per foot run, described as "splayed, cutting and waste."
For cutting to hips and ridges at per foot run.

Take the filletings at per foot run, describing whether in cement or mortar. Also, the pointing to verge. Number the hip hooks and T nails, and state in how many oils they are to be painted.

To ascertain the length of the hip rafter, there are two or three methods, but the following is perhaps the simplest and best.

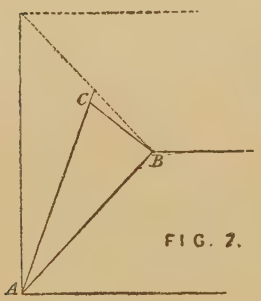


FIG. 7.

Make the hip line on the roof plan the base of a right-angled triangle, the perpendicular of which is the height of the roof as delineated on the elevation, and the hypothenuse will be the length of the hip or valley. Taking the example of the plan of roof given, of which A B is the hip, make B C at right angles to A B, and the same length as the roof is high. Then A C will be the required length of the hip.

TABLE III.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

Plain tiling	At per square of 100 ft. superficial.
Pantiling	„
Ridge tiles	At per foot run.
Hip tiles	„
Valley tiles	„
Plain tile creasing	„
Mitres to hips and ridges ..	At per number.
Hip and T hooks	„

CHAPTER IV.

SLATER AND SLATE MASON.

MEASURING SLATING—ADDITION TO—EXAMPLE OF—ALLOWANCE FOR HIPS AND VALLEYS—IRREGULAR CUTTING—DEDUCTIONS—CIRCULAR—DESCRIPTION OF SLATE USED—SIZES OF SLATES—WHICH COMMONLY USED—FANCY SLATING—RIDGES—HOW SET—HIPS—FILLETINGS—DAMP COURSE—CREASING—SHELVES—WORK TO—CISTERNS—SINKS—PAVING—WORK TO—SKIRTINGS—LOUVRES—LABOUR ON SURFACES—CHIMNEY-PIECES—FIXING—TABLE IV.—SHORT WAY OF FINDING QUANTITY OF SLATES.

In measuring slating, take the length by the breadth, the latter being taken from the edge of the eaves to the top of ridge as in the tiles. Add to this whatever appears of the lower course of slates. Thus supposing the slates to be countesses (20 by 12) and laid to a 2-inch lap, the bottom course will show 8 inches. This would be the required addition to make to the measurement.

Allowance for hips and valleys is thus made. Take the length by 6 inches wide on each side, and add to it the measurement as an allowance for cutting and waste, the hip being measured as described in tiles. In addition, make an allowance of 6 inches wide by the length for all irregular cuttings, as for example, to angle chimneys. Make deductions as they appear.

Where the slating is laid circular it must be kept separate from the straight, and described accordingly. It is measured similarly to the straight, with the same allowances.

Be careful to state the description of slating used, with the size (whether duchesses, countesses, &c. &c.), also specify the lap, also the quality of nails, whether copper, zinc, &c., and the number to each slate.

It may be advisable here to give the size of slates generally in use—

	In.	In.		In.	In.
Queens	36 by	24	Countesses	20 by	10
Imperials..	30 „	24	Viscountesses.. ..	18 „	9
Princesses	24 „	14	Ladies	16 „	8
Duchesses	24 „	12	Doubles	13 „	6

Note.—Of these the duchess and countess are the more commonly used. Of course it will be necessary to keep the different descriptions of slating separate, also to state whether fancy slating—slating laid diagonally being so called.* Should the slating be required to be cut in any form, a sketch would the better exemplify the description, and should be given to enable the contractors to estimate with greater certainty. Slate ridges and cresting are measured at per foot run. State whether set in red lead, putty, and screws, &c. Slate hips are measured at per foot run, as will be seen by perusal of the Table IV. Measure all filletings, and state whether in lime and hair mortar or cement. These are billed with the bricklayers' work, as before described.

Damp Course.—Take the length by the width, and state whether laid double, and if bedded in cement.

Creasing.—In taking this item it is necessary to state if in cement.

Shelves.—Take the length by the width, and include in such measurement any portion let into walls.

The edges, where rubbed down or rounded, to be taken at per foot run, and described how finished.

Rebates, grooves, tongues, &c., are also measured at per foot run. If the joints be cemented with red lead or putty, it must be stated.

The cutting and pinning into wall is also taken at per foot run. See Table IV.

Cisterns are usually numbered, stating the description of slating with the thickness required for sides and bottom, and the capacity of water required in gallons. It is advisable also to give the inside or net dimensions of the cistern, as where

* I avoid all questions of reasons as to whether it should be so called. I desire only to deal at present with that which exists.

the bottom is thicker than the sides, as is customary, it will be impossible to form a correct estimate where this is not done. Describe how it is to be put together, specifying the bolts and nuts. All holes for plumber are taken at per number "extra." It should be also stated if fixed, as otherwise this will be afterwards charged as "extra."

Sinks.—Give the dimensions, length, breadth, and depth, and full description, stating if fixed, including cutting and pinning into wall, &c. All holes are to be taken as "extra." If rebated, it must be stated, as it is an "extra." See the Table as to how measured.

Paving.—It is necessary to describe as to the finishing to surface whether rubbed, &c., and if the edges are sawn or rubbed, they will be measured separately at per foot run.

Skirtings.—Take the length and describe the width and thickness of the slate, including all screws, and drilling holes.

Louvres.—In taking these it is necessary to state the depth and thickness of slate, and the surfaces if planed, &c., including edges. Number the fair ends, and the fitting to stone or other grooves.

Labour on surfaces, as planing, rubbing, enamelling, is to be taken at per foot superficial.

Chimney-pieces are usually numbered and a price affixed, the price and value thereof differing almost as much as in the case of marble.

The fixing is taken under the head of "bricklayer."

TABLE IV.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

Slating	At per square of 100 ft. super.
Slate ridging	„ „ foot run.
„ hips	„
Slate damp course	At per foot super.
„ shelves	„
„ paving	„
Slate creasing	At per foot run.
„ louvres	„
„ skirtings	„
Labour to planing to surface	At per foot super.
„ edges, grooves, rebates, &c. ..	„ run.
Slate cisterns	At per number.
„ sinks	„
Cutting holes for plumber (extra) ..	„

In concluding this trade I would mention a "short way" to find the quantity of slates required. Should the reader wish to find the amount of slates necessary to cover any given area,—take the length the third slate covers the first from the length of the slate, and divide the remainder by two. Multiply the result by the width of the slate, and the product will be the number of square inches of the surface of a single slate. The total area of the roof divided by this number will give the total of slate required. It will be necessary to make an addition for double course at eaves, and for the cuttings to hips, &c.

CHAPTER V.

MASON.

DIFFERENCE OF OPINION AS TO MEASURING—OPINION OF MASONS—CONFINED TO DESCRIPTION OF WORK—WANT OF KNOWLEDGE OF SURVEYOR—LABOUR ON STONEWORK—METHODS OF MEASURING—HOW SOME SURVEYORS TAKE—SMALL JOBS—WIDE TENDERS, CAUSE OF—RUBBLE-STONE WALLING—MEASUREMENT OF, DEPENDS ON LOCALITY—BY YARD SUPER—BY PERCHES—BY YARD CUBE—DEDUCTIONS FROM—EXTRAS TO—QUOINS—WHEN OF BRICK—BRICK LINING—DEDUCTIONS FROM—WROUGHT STONEWORK—HOW TO BE TAKEN—ASHLAR—BLOCK-STONE—IRREGULAR SHAPES—EXAMPLE OF—PLAIN WORK—SUNK WORK CIRCULAR—CIRCULAR WORK—CIRCULAR SUNK WORK—CIRCULAR CIRCULAR WORK—MOULDED WORK—REASONS WHY DEFINITIONS GIVEN—YORKSHIRE STONE—DIFFERENT MEASUREMENT FROM OTHER STONE—WHY—HOISTING AND SETTING—OVER 6 FEET IN LENGTH—PAVING—LABOUR TO—LANDINGS—LABOUR TO—EXCEEDING 6 INCHES THICKNESS—STONE OVER 30 FEET SUPER—HEARTHS—SHELVES—CURBS, COPING, &C.—EXAMPLE OF—STEPS—RISERS—THRESHOLDS—SILLS—CRIBS—CRIBSTONES—TEMPLATES—PORTLAND, BATH, AND OTHER BUILDING STONE—HOW MEASURED—LABOUR TO—HOISTING OVER 40 FEET—HALF-SAWING—EXPLANATION OF—ABSTRACTING OF—PLAIN WORK—PLAIN FACE—SUNK WORK—MOULDED WORK—GROOVES, &C.—CHIMNEY-PIECES—PAVING—LANDINGS—NUMBERS—CARVING—EXAMPLE OF MEASURING—SPANDREL STEPS—WINDOW SILL—ARCH STONE—COPING—WINDOW HEAD—TABLE SHOWING CONTRAST BETWEEN ENGLISH AND SCOTCH MEASUREMENTS OF STONEWORK.

PROBABLY there is no trade about which so much difference of opinion exists in the method of measuring as there is with the mason. And who shall say which method is right? Each surveyor holds to his own idea as the correct one; and if we refer to the really practical men—the masons themselves—I venture to state that we shall get just as many conflicting

opinions as are to be found amongst those who study simply the theory. Happily, however, the differences that do exist are principally confined to the descriptions of the labours expended upon the stonework; and this arises in some degree from a want of knowledge on the part of the surveyor as to how the stone should be worked, or what preparatory labour should be taken on stonework in cases of elaborate detail; consequently matters of doubt are apt to be expressed incorrectly. It should always be observed that the labour upon stonework is to be measured and described according to the nature of its execution, and should at the same time be measured in the order in which the labours are worked, the inferior work generally being done first and the superior faces last. In proceeding to the measurement of stonework, there will of necessity be many who differ with the methods I advocate, and which I have adopted in my own practice. To such I say, consider your own method and that advocated by me, and compare them. Where differences exist, ascertain why one surveyor should take certain works differently to another. If some such course as this be pursued we should ultimately arrive at a time when an uniformity of measurement will be adopted, and all such differences shall cease to exist. It is a well-known fact that many surveyors take out the labour on stonework somewhat excessively, so as to cover any omission in quantity or error of description, which through their incapacity might arise. It is also well known that the more elaborately the work is measured the greater will be the builder's estimate. Still, this should not deter men from pursuing a course which is manifestly correct. We frequently see surveyors, in small jobs especially, omitting to measure labour at all, trusting to descriptions and sketches—thus avoiding what they consider unnecessary trouble. And I venture to observe that very few surveyors or builders could estimate, unless it be approximately, what would be the value of it at a glance; and in cases where such works are to be carried out to any extent, half-a-dozen builders would tender as widely different as those that are so constantly brought before our gaze weekly in the professional papers; and who shall say that these very cases do not arise from some such cause? In small jobs, such works as string-courses, copings, plinths, &c.,

might be measured in this way; but even then, I think, this method is to be deprecated, and I would recommend that the ordinary, or more professional mode be adhered to.

There is one description of stonework, however, which requires very little practical knowledge in ascertaining the way of measurement, and as this is the simplest, and of a much less expensive nature than the ordinary descriptions, I will treat of it firstly. I refer to the stone-rubble walling; and although there are so many kinds of this class of stonework, they are all measured in one uniform way, which way, however, depends upon the standards adopted in the several localities in which the stone abounds. In neighbourhoods within the vicinity of the stone quarries, and where stonework is cheaper than brickwork, it is frequently—I may say generally—the case for houses, &c., to be built of the stone in what I may term its natural state—that is, unworked; and as I have just stated that in such cases the method of measurement depends upon the locality, and as various localities have different methods, it is always advisable, where a surveyor has to deal with it, that he should obtain from some one in the neighbourhood what is the local standard of measurement. That which I have found to be the most usual rule in such cases is to measure it by the yard superficial, and state the thickness of the wall and the description of the work, whether coursed or uncoursed, or as the case may be. In some districts, again, this kind of stonework is measured by the perch of 18 superficial feet of an uniform thickness of 24 inches—all thicknesses of walls being reduced to this standard, after the same manner that brickwork is reduced to the rod of 272 feet super of 1½ brick thick. And another method is to measure it by the cubic yard. In either of the latter cases, all labour applied to the face of the work would have to be taken and described separately, such as scabbling, &c., which in the first case—viz. where measured by the yard superficial and the thickness stated—would be obviated. Where the labour is taken separately, measure it by the foot superficial. Window and other arches, where executed in this description of material, would be measured in with the ordinary walling, and a second dimension taken of the arch, which would be described as "extra to rough hammer-dressed arches, 61

inches high, with radiating joints," or as the case may be. This is measured by the foot run. "Extra labour to forming small openings" are better numbered. Quoins, where executed of different material to the walling, must be taken separately; and where laid in regular blocks, the labour must be taken out in the manner hereafter to be explained. Where, however, it is of the same material as the wall, it should be measured in with it, and any extra labour in working and setting should be measured separately. Where the quoins are of brickwork, it is customary to measure them by the foot run; and as all descriptions of rubble-walling should be provided with an internal lining of brickwork to prevent osmatic action, brickwork not being so susceptible to the wet as stone, and it also presents a better surface to plaster against, it is usual in such cases to measure the brickwork at the same time as the stonework. The brickwork would be reduced to the rod in the ordinary manner, but will require to be described separately from the other as "brickwork in lining to rubble-stone walling."

I may observe, in concluding this description of stonework, that it is only customary to deduct other kinds of stonework and other material where it is over 4 inches in thickness.

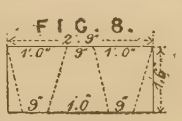
Proceeding then to the measurement of wrought stonework, or stonework upon which a much greater degree of labour is expended in the working of the faces, beds, and joints, we arrive at that portion of our subject which requires more experience and a greater amount of care.

Each stone must be taken separately, the cubical contents being ascertained firstly, and the labours taken lastly. Ashlar work, however, is usually taken, including all labours, in beds and joints, either by the foot superficial, stating the average thickness, or by the foot cubic; but in the latter case the face will have to be measured separately and described as worked, whether rubbed or otherwise, whereas in the former this is obviated by including it in the description.

In measuring block-stone, take the full dimensions of the stonework as it comes to the banker. Adopt an uniform method in taking the dimensions. The usual way is to take, firstly, the length; secondly, the depth; and lastly, the height. In cases of irregular pieces of stonework, the dimensions must be taken of

the smallest rectangular block out of which the said stone can be cut; consequently it is evident that were every such piece of stone cut in this way there would be considerable waste. This, however, is not always the case, as a clever mason will consider before cutting the stone how he can economize it by sawing two or three irregular pieces out of one stone, and this is easily perceived in the case of arch stones, where the several stones would be measured the full size, and the *oblique* surfaces taken as sunk work, as will be hereafter explained. Take the example shown in Fig. 8; here we have three arch stones, which, taking the largest dimensions for the measurement of each stone, would be, presuming the thickness to be 12 inches,

FIG. 8.



3	1·0 1·6 1·0	4·6	Cube stone.

But looking at the sketch, it is evident that the three stones could be cut out of a single block 2 feet 9 inches long,

	2·9 1·6 1·0	4·2	Cube stone,

and that a saving would be effected by the mason to the extent of over 4 inches. Still, however, the former is the method which is always carried out, and it would not be wise for me at present, perhaps, to advocate any other course.

The following are the descriptions of the various labours executed on stonework:—

Plain work consists of the removal of the irregularities of the stone with the least possible waste of material labour, so as to obtain what the term implies—a plain face, or even surface.

Sunk work is formed by working below the flat surface, as in rebates, weatherings, sinkings, &c., and it may be either straight or circular, but when circular it should be kept separate from the straight, and described as

Sunk work circular.—Fig. 9 is a sketch of the latter.

FIG. 9.

Circular work comprises the labour to concave and convex surfaces, such as to circular soffits, shafts of columns, and the like.

Circular sunk work consists of the labour required to form circular sinkings as distinguished from straight sinkings.

Circular circular work, or spherical work, as it is sometimes called, comprises the labour in forming niche heads, domes, and the like, being circular on plan and circular in elevation.

Moulded work comprises the labour in forming mouldings in stonework, and may be either straight or circular; where the latter, as to bases to columns and over arches, it must be kept separate from the straight.

I have thought it necessary to give the foregoing definitions for the benefit of those of my readers whose experience of the subject has been insufficient for them to find them out practically, but I shall hereafter show the method of measuring them by a series of examples; such being, I think, of greater advantage to the student than simply by my defining certain rules, and leaving him to carry them into practice.

Yorkshire Stone.

In proceeding to treat of the several kinds of worked stones, I will speak firstly of Yorkshire stone. The measurement of this stone in London varies from that of the other stonework, inasmuch as, in many respects, it is customary to combine the material and labour in the one item, instead of keeping them separate, as explained of stonework in general. This arises in great measure from the fact that the labour executed upon the stone is, in the majority of cases, worked at the quarries, and sent up to London in a finished state, ready for setting. And, moreover, this description of stonework occupies such a limited and ordinary position in a building, that any further detail than that usually given by quantity-surveyors would be unnecessary. Of course, where used to any large extent, or where it occupies the positions now taken up by the stones in more general use, viz. in walling, &c.—as, for example, Portland or Bath stones

—it would have to be measured in the same way as these stones, as will be explained hereafter.

NOTE.—It is always understood that "hoisting and setting" is to be included on each of the several items for the stonework; and in the case of Portland and other stones it is included in the cube blocks of the stone; and in the latter case all stonework more than 40 feet above the ground must be kept separate from that below that height.

Also, any stone which exceeds 6 feet in length must be kept separate from the general item, and be described as scantling-lengths, and the different sizes stated.

Paving.—Take the length by the width, and state the thickness, and the description of the labour executed upon the stone, whether tooled or otherwise. State also if laid in regular courses, and if bedded and jointed in mortar, cement, or as the case may be. Where the plan is irregular, and it becomes necessary to cut the stonework to fit against splays, or irregular projections, it will be necessary to measure the cutting separately. This is taken by the foot run, and described as "cutting and waste to ($2\frac{1}{2}$ inches) York paving," stating the thickness. No allowance, however, is made in the superficial area of the paving to meet such contingencies, the *net* surface only being measured, the additional cost being provided for by the item for "cutting and waste." Any circular cutting should be kept separate from the straight. Number any holes for pipes, &c.

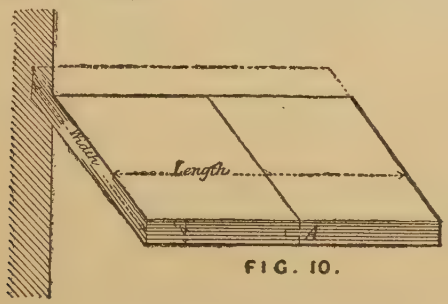


FIG. 10.

Landings are measured similarly to paving, and my remarks thereon will apply here. The student will have to include in the dimension for the length or width the portion tailed into the wall, as per sketch, Fig. 10. In the description state whether both faces are worked, and, if so, the nature of the work on each face, as it is frequently the case for one face to

oe rubbed, whilst the other is only tooled. Cutting and waste would be measured as described to paving, and any rubbed or tooled edges would be taken in the same way. Where the thickness of the landing exceeds 6 inches, it is customary to take the edges by the foot superficial. Joggle joints, Fig. A (sketch 10), are measured by the foot run, and described as "joggle joint and cement to 4-inch landing," or as the case may be, stating the thickness of the landing. Any circular cuttings would have to be kept separate from the straight, but if preferred may be taken with the same, and a second dimension taken for the extra labour in forming circular cutting, beyond the price allowed for the straight. I think the former the better plan of the two, however, and one that is more in vogue. Number all mortises for rails, newels, &c., and state whether they include "running with lead" to the rails or newals when they are fixed, though the labour in fixing the same would of course be included in the Smith, the lead, however, being usually taken with the mortise.

It should be remembered that when the length of a landing exceeds 6 feet, or the area of any one stone contains more than 30 superficial feet, it must be kept separate, and specified accordingly.

Hearths.—In measuring hearths, take the full dimensions, and specify the thickness of the material. State whether rubbed, or otherwise, and number the notchings for the chimney-pieces, stating whether single or double.

Shelves, &c., are measured in a similar manner to the foregoing, including the cutting and pinning to walls—all worked edges, &c., being taken as described to landings.

Curbs, Copings, &c., are measured by the foot run, stating the length, and giving scantlings, the largest dimension being taken each way. Specify the nature of the workmanship, whether tooled, rubbed, or otherwise; and in the case of copings, it is always preferable to give a sketch in addition to the description. Thus sketch Fig. 11 would be described as—

20·0	12 in. × 4 in. tooled, weathered, and throated on both edges, York coping, as sketch, including all joints.

Some surveyors number the joints to copings, curbs, &c., but as it is an understood fact that one joint is allowed to every 3 feet of stone, I have always considered it unnecessary to number them, and accordingly include them in the one item with the stone. It will, however, be necessary to number all cramps, plugs, &c., stating whether galvanized iron or otherwise, and including running with lead. Also specifying the length of the same, and if plugs are single or double. Where angle stones occur they must be kept separate from the straight, and specified accordingly.

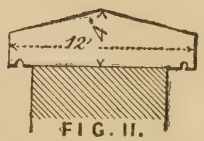


FIG. II.

Steps are measured by the foot run, stating the length and scantlings, and giving description of the work. For the length include the portion pinned into the wall; and where there is more than one step, take a running dimension the length of the step, for the labour in forming "back joint" or rebate.

Risers are also measured in this way:—Enumerate the "fair ends" and the "ends cut and pinned to wall in cement"; and also number all mortises for iron balusters and newels, as described to landings, and also any mortises for door posts.

Thresholds are measured as the foregoing.

Sills.—Measure by the foot run, taking the length of the sill, and state the width and thickness. Describe the nature of the work on the same, whether tooled, weathered, and throated, or as the case may be. Number the "fair ends," the "ends cut and pinned to wall," and also for "bedding hollow and making" good to sills.

Sinks are usually numbered, the dimensions being given, including the portions pinned into the wall. State the thickness or total depth of the sink; and some surveyors, in addition give the depth of the sinking in the stone, though this course is exceptional. Take the labour to cutting and pinning to wall in the manner already prescribed to other work, viz. by the foot run. Should the sink have one or more rounded corners, number them; and also enumerate the rebated hole for bell trap. Stone bearers to sink would be also measured by the foot superficial.

Sink-stones are also numbered, stating the sizes and the thick-

ness of the stone, and the number of holes, and whether dished or otherwise.

Templates are numbered, giving dimensions and stating how worked, whether tooled or otherwise; also whether laid in cement.

Portland, Bath, and other Building Stones.

I now proceed to treat of Portland, Bath, and the other building stones, which are in more general use on account of their being better adapted for building purposes, and their being capable, owing to their texture, of receiving a greater amount of decorative treatment than the stones already mentioned.

In dealing, then, with these stones, it is customary to take the cubical contents of the stone first, and then the various labours executed upon it, keeping the stone and labour separate. There is, however, an exception to this rule in the case of ashlar work, which is measured by the foot superficial, including all beds and joints, stating the average thickness of the stone, as shown in the Table. With this exception, the stonework must be measured by the foot cube, and the labours upon the various faces taken separately, according to the execution. It is better to measure the labours in a particular order, and it is recommended that the inferior be taken first, beginning with the half-sawing, then taking the beds and joints, plain face, sunk face, moulded face, &c. Such a system enables the student to find any dimension afterwards without difficulty. Commence at the lower portion of the house, and work from left to right, as recommended in "Bricklayer." All stonework 3 inches thick and under is to be measured superficially; over that thickness to be taken at per foot cube. Proceeding, then, to the measurement of the stone, it is also advisable to keep to one uniform method of taking the dimensions of the several blocks to obtain the cubical contents; as I have already observed all labour and material in hoisting and setting the stones is included in the item for the cube stone. Where the stonework is raised above 40 feet from the ground, it must form a separate item from that below that height.

I have already, in a previous article, given the definitions of

the ordinary labours upon stonework, and I will now endeavour to explain the methods of measurement I adopt, and give examples in illustration of my own practice, because I am sure my readers will consider that examples of actual practice are far preferable and easier to understand than theoretical principles, which, even if carefully read, are not thoroughly understood, and are therefore soon forgotten.

As I have before observed, the stone is to be measured as it is actually intended to be worked, and the net surfaces for the labour only to be taken. I will speak of the labours in the order already prescribed.

Half-Sawing is taken upon all sides of the stone upon which no other labour is to be executed, all other labours including this item. It is generally applied to the backs of stone, which would require no additional labour, but it must also be taken on every side when the stone is laid upon or against brickwork. Of course when certain faces are left rough as it comes from the quarry, no sawing or other labour would be taken.

For the instruction of those of my readers who may be yet quite novices in quantity surveying, and who consequently need information not necessary to the more advanced, I would mention that by taking half-sawing to each stone, we equalize this labour upon the several stones which are sawn, as the sawing itself would apply to two stones, both being sawn at one and the same time. After the whole of the half-sawing, however, is brought into the abstract, it should be divided by two, and billed as "sawing," though many surveyors would keep it and bill it as "half-sawing." I prefer the former, as sawyers are paid according to the amount of the "sawing," not "half-sawing," which they execute. This point, however, is very unimportant.

Plain Work in Beds and Joints is taken to stones laid upon or against other blocks of stone; otherwise, as I have just observed, they would be taken as half-sawing. Take as an example the case of a stone quoin to a brick building, the beds of which would be taken as plain work in beds, the stones being laid one on another, whilst no joints would be measured, the ends being simply measured as half-sawing. Should, however, the quoins be set against stonework, as in the case of a

stone building, the joints would have to be measured similarly to the beds of the stone, and abstracted with that item as shown in the Table. Some surveyors measure only one plain bed and one plain joint to each stone, with certain exceptions (piers, pilasters, columns, &c.), but I think it a much better plan to measure the whole of them, and state in the bill that this has been done. Where the work, however, is continuous, it is customary to allow for joints to every 3 feet of stone only.

Plain face is taken to all external faces of the stonework which are not otherwise worked. It is also taken to the faces of stones, where it is necessary to be executed for the purposes of setting out other work. In cases of elaborate detail this is frequently the case, and also in tracery.

Sunk work is taken where it occurs; and must be described as it is executed, whether rough sunk, sunk work in beds and joints, sunk work in rebates, in weatherings, &c.; and if circular it must be taken separately. Measure the whole of the surface of the sinking, that is, take the girth. In the case of a rebate, as Fig. 12, the dimension for the width would be 6 inches, and the ends (if any) would be numbered. No deductions would be taken to any joints which might occur, and the plain faces to top and side would be measured the full width and height of the stone, the rebate being executed afterwards. This description of work is further explained in the examples to be hereafter given.

Moulded work is measured by the foot superficial, taking the length by the girth, care being taken to add for all returns to the length. Girth the work for the width, but simply the moulding, the weathering being taken as sunk work and not moulded—the moulded being of greater value.

Grooves, throats, rebates under 3-inch girth, chamfers, splays under 3 inches wide, reeds, flutings, joggle joints, cutting and pinning to landings, &c. &c., are measured by the foot *run*.

Number *chimney-pieces*, giving full description of workmanship and material, though many surveyors prefer to measure plain chimney-pieces by the foot superficial, taking labours to edges, and numbering rounded corners. If numbered, state the prime cost value, exclusive of the fixing.

Paving, Landings, &c., would be measured as described to York stone.

Numbers.—Enumerate all mortises for door posts, balusters, iron railings, cramps, plugs, and dowels; also all cutting and pinning to ends of steps, notchings, letting in coal plates and air gratings, sink-stones, sinks, pipe holes. Also all mitres, stating whether internal or external, and giving the girth of the mouldings, &c., to which they refer; stops, whether to mouldings, chamfers, &c., stating size and whether square, splayed, moulded, or as the case may be. Also number any items for carving, &c., as shown in the accompanying Table. In taking cramps and plugs, state the sizes and the metal, which should be reduced to weight; the labour of letting in and running with lead should be taken separately.

Carving.—Measure strings, parapets, or where the work is continuous, by the foot run. Number all single items. I have given examples of different descriptions of carving in Table V.

In conclusion, I would observe that if I have omitted describing any particular class of work, I believe the reader will be able, from the general remarks which I have made, to apply the rules laid down to each individual case; but at the same time I have thought it advisable to give a few general examples for the reasons already stated.

In prefacing Table V., I would observe that therein I have laid before my readers briefly the various descriptions which customarily come under the notice of the quantity surveyor, but of course there will be many others, every job varying in some particular; but I think sufficient has been given to illustrate the principle of the measurement of stonework.

Table V.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

Local Stone Walling.

Rubble stone in walling in random courses in foundations, well bonded and well flushed with mortar and grouted with hot lime and sand every three courses—average 2 ft. thick	At per yard super.
Ditto above foundations, average 18 in. thick, ditto, ditto	„

Extra to rough hammer-dressed arches 16 in. high, with radiating joints	At per foot run.
Ditto labour to external quoins	,,
Ditto internal ditto	,,
Ditto to forming openings for air gratings (12 × 6) in 18-in. wall	At per number.

Yorkshire Stone.

Tooled paving, laid in regular courses, and bedded and jointed in cement	At per foot super.
Ditto shelves	,,
Rubbed hearths	,,
Tooled one side landings	,,
Rubbed one side landings, tooled the other side	,,
Tooled steps and risers to specified sizes, including tooled edges	At per foot run.
Solid rubbed steps	,,
Feather-edge tooled coping, set in mortar and throated, including all joints	,,
Weathered and throated rubbed window sills	,,
Rubbed curb	,,
Cutting and pinning to 3-in. landing in cement	,,
Labour to back joint	,,
Ditto to fair edge to 4-in. landing	,,
Ditto circular ditto ditto	,,
Joggle joint and cement to 4-in. landings	,,
Tooled templates and setting in cement	At per number.
Ditto corbels for plates pinned in cement	,,
5-hole dished sink-stone	,,
Tooled and dished sinks, with rounded corner, and hole cut and rebated for bell trap	,,
Ends to steps cut and pinned	,,
Fair ends to steps	,,
Quadrant ditto	,,
Extra to corner stones in coping	,,
Mortise holes	,,
Ditto and lead	,,
Rebated holes for coal plate	,,
Double notches in hearths	,,
Plain joints and lead plugs to steps	,,
Caulking holes and lead for gratings	,,

Portland, Bath, and all Building Stones.

Portland stone, including hoisting and setting	At per foot cube.
Ditto ditto above 40 ft. from ground	,,
Sawing	At per foot super.
Plain work in beds and joints (all faces measured)	,,
Circular ditto	,,
Plain face	,,
Circular ditto	,,
Rough sunk work	,,
Sunk work in beds and joints	,,
Ditto in arch stones	,,

Sunk work in rebates for frames	At per foot super.
Ditto rubbed	,,
Ditto ditto circular	,,
Circular face to shafts of small columns	,,
Circular circular plain face	,,
Moulded work in cornices, &c.	,,
Circular ditto	,,
Ditto ditto in small caps and bases	,,
Circular circular ditto	,,
Portland stone ashlar, average 6 in. thick, including bonders, joints, and faces	,,
Groove for iron tongue	At per foot run.
Ditto for iron frame to revolving shutters	,,
Ditto for lead flashing and burning in	,,
Sunk splay, 1 in. wide	,,
Ditto rebate, 3 in. girth	,,
Stop chamfer, 2 in. wide	,,
Mouldings under 6 in. girth	,,
Stopped ends to sinkings	At per number.
External mitres	,,
Internal mitres	,,
Splayed stoppings to 2-in. chamfers	,,
Moulded ditto ditto	,,
Mitres ditto ditto	,,
Stopped ends to moulding 9 in. girth	,,
External mitres ditto	,,
Internal mitres ditto	,,
Intersecting mitres ditto	,,
Returned, mitred, and stopped ends to ditto	,,
Housings for ends of steps 14 in. × 16 in.	,,
Fair sinkings, 2 in. wide, 3 in. high, and 2 in. deep, to form dentils	,,
Ditto 2 in. × 6 in. × 4 in. deep, to form small moulded trusses in cornice	,,

LABOUR: *working and carving, including boasting, for ditto.*

Scroll ornaments in panels, 18 in. × 9 in. extreme size, as sketch	At per number.
Quatrefoil sinkings, 8 in. × 8 in. and 1½ in. deep, as sketch	,,
Head to keystone, 12 in. × 9 in. on face, as sketch ..	,,
Truss 12 in. face, 9 in. profile, and 2 ft. high, as sketch	,,
Terminal 3 ft. high, and 2 ft. 6 in. wide, as sketch ..	,,
Caps to columns 6 in. diameter at necking, and 12 in. high, in bold relief, including moulded abacus and necking	,,
Ditto to ¾ columns, and ditto ditto	,,
Ditto to pilasters, 18 in. wide at necking and 9 in. high, with two 10-in. returns, in bold relief	,,
Carved boss terminations, 5 in. × 5 in. to moulded string	,,
Ditto 4 in. diameter on face of moulded string	,,

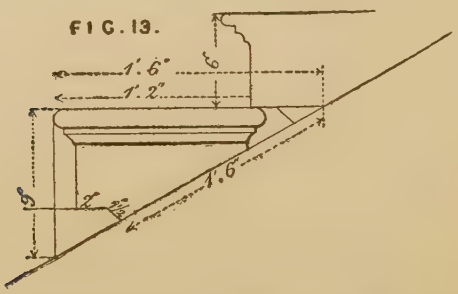
Enrichment, 9 in. high in cornice, in bold relief, as sketch	At per foot run.
Mitred angles to ditto	At per number.
Stopped ends ditto	,,
Perforated ornamental parapet, 10 in. high, through 6 in. stone	At per foot run.

Examples of Measuring Stonework.

I now give a few illustrations, the better to exemplify the instructions given.

Spandrel Steps.

FIG. 13.



There are several methods of measuring spandrel steps, but I think that in most general use is to take them as follows:—Measure from out to out for the length, including the portion pinned into the wall; for the breadth, take from the edge of the nosing to the acute angle; and for the height, take the dimension from top of step to angle. This divided by 2 will give the cubical contents of one step. I have shown the extreme dimensions of the stone by dotted lines. Spandrel steps are measured in this way, as two steps can be cut out of a rectangular block of the dimensions given.

½	5·0	
	1·6	
	9	Portland stone step.
½	1·6	
	9	Half-sawing to one end.
		1·2
		2
		1·4

5·0
1·4 Plain face to top.

5·0
1·6 Add soffit.

·6
·6 Add front of step pinned into wall.

2
1½
1½

5

5·0
5 Sunk work in rebate.

4·6
6 Add to front (stopped).

1·2
4 Add end.

4·6
1·4

5·10

5·10
6 Moulded work.

No. 1 mitre to 6-in. moulding.
No. 1 stopped-end ditto.
No. 1 mitred and returned end ditto.
No. 1 step cut and pinned to wall.
No. 2 mortises for balusters.

Should the moulding not be returned to step, the end would be taken as plain face. The soffit of spandrel winders would be measured as circular plain work.

WINDOW SILL.—FIG. 14.

4·0
1·0
4 Portland stone sill.

4·0

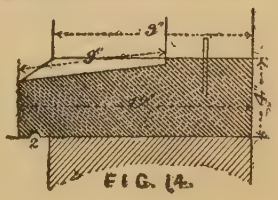


FIG. 14.

1·0
4

1·4

	1·4	Half-sawing.
2	1·0	
	4	Add ends.

4
4
2
10

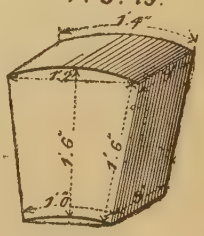
	4·0	
	10	Plain face.
2	4	
	2	Add ends.
	4·0	
	9	Plain face sunk in weathering.

No. 2.—Stops to weathering.

	4·0	Groove for tongue.
	4·0	Throat.

Arch Stone.—Fig. 15.

FIG. 15.

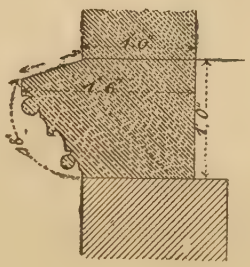


	1·2	
	9	
	1·6	Portland stone.
	1·2	
	1·6	Half-sawing to back.
	9	
	1·6	Plain work in one joint.
	9	
	1·6	Plain work, sunk ditto.
	1·4	
	9	Circular plain work in bed.
	1·2	
	1·6	Plain face.
	1·0	
	9	Circular ditto.

CORNICE.—FIG. 16.

	3·0	
	1·6	
	1·0	Portland stone cornice.
	3·0	
	1·0	Half-sawing bottom.
	3·0	
	1·0	Bed-top.
2	1·6	
	1·0	Joints.
	3·0	
	1·0	Plain face-back.
	3·0	
	7	Do. sunk in weathering.
	3·0	
	1·6	Moulded work.

FIG. 16



HEAD TO WINDOW.—FIG. 17.

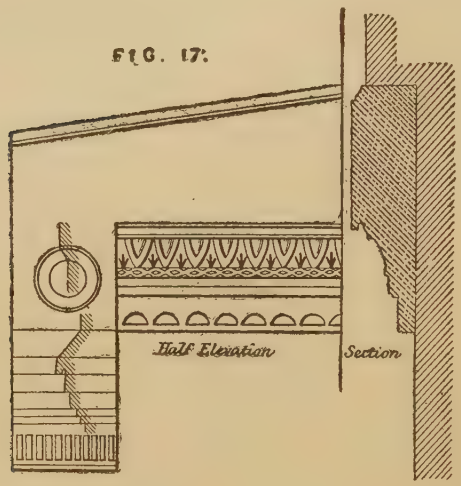
	7. 6	
	2·10	
	9	Portland stone.
	7· 6	
	2·10	Half-sawing (back).
2	2·10	
	9	Add ends.
2	1· 2	
	9	Plain work in beds.
2	3·10	
	9	Sunk work (top).
	7· 6	
	2· 6	Plain face (average).
	5· 0	
	6	Add.
	5· 0	
	9	Moulded work.
	3·10	2 Stops.
	4	Add moulding top.

1 Mitre.

5· 0
6 Egg and tongue carving.

5· 0 Enriched bead ditto, 3 in. girth.

2 Circular moulded and sunk panels, 1 ft. 4 in. diameter.
15 Small semicircular splayed sinkings as sketch.



2 1·2
1·7
1·2 Add stone truss.

2 1·2
1·7 Half-sawing back.

2 1·7
1·2 Add one end.

2 1·2
1·2 Add bottom

2 1·2
1·2 Plain bed.

2 1·7
1·2 Plain face (one end).

2	1·2	
	6	Add (face).
2	1·2	
	6	Sunk work in weathering.
2	1·2	
	3	Add in rebates.
2	1·2	
	1·3	Moulded face.

2 Narrow circular sinkings, 4 in. high, with circular stops.

Before concluding the trade, I have thought it advisable to contrast the English custom of measuring with that of the Scotch, and for this purpose I have had forwarded to me the "Rules and Regulations for the Measurement of Mason Work in Edinburgh, Leith, and vicinity, as agreed upon by the Architects, Surveyors, and Builders" of those neighbourhoods. The perusal of this pamphlet has given me much pleasure, and I regret that some such system as this has not been adopted in the metropolis. Rules for the guidance of all concerned could easily be drawn up at a few meetings of the leading members of the profession and the building-trade, which would dispense with many controversies as to the measurement of certain trades which exist to so large an extent at the present time. My desire in the present work has been to lay down a basis of action, but I should infinitely prefer such a meeting as that I have just mentioned as one that would meet more with the approval of the profession as a body.

The annexed form I give for my Scottish readers who are interested in the subject, and who may not be possessed of the pamphlet to which I have made allusion, and also for those of my English readers who may have business with our neighbours "over the border." I have only mentioned therein items as to which there is a difference of measurement. As will be observed, I have made no remark on local rubble-stone, the measurement of which is also spoken of in the pamphlet, as it must necessarily differ in many respects from the rules which I have laid down, it being so entirely dependent upon custom, even in our own country—as it differs in many counties.

TABLE VI.

DESCRIPTION.	METHOD OF MEASUREMENT.	
	SCOTCH.	ENGLISH.
BRICKWORK.		
Brickwork in partitions, gables, and party walls.	At per yard super, deducting only for press voids, but not for fire-places, vents, or window bossings	At per rod of 272 ft. super of 1½ brick thick; the brickwork, where above ½ brick thick being reduced to this standard. Half-brick partitions at per foot super. All openings are deducted, including the fire-places, but not the flues, the extra labour in forming them being taken as an equivalent for the saving in brickwork.
Ditto circular on plan, or in arches and inverts.	Ditto, taking the largest size.	Ditto, taking the mean circumference.
Plumbing corners of external walls.	At per foot lineal.	Not measured.
Reveals of outside doors and windows.	At per foot lineal for extra labour.	Not measured in common brickwork. Measured in superior facings with the front.
Superior bricks for face work, point-pointing, and flushing for white-washing.	At per yard super.	At per foot super.
HEWN WORK.		
All hewn work, except stair-steps, plats, hearths, and pavements.	Charged for its additional value over price of rubble-building measured on exposed surface, and classed and rated separately, according to size of materials and kind of work.	Stone and labour measured separately, the stone being taken in one item, and the labours classified according to the execution.
Base courses, strings, belts, plinths, narrow copings, and blocking courses.	At per foot lineal, specifying breadth, thickness, and workmanship.	As above. Exception made with regard to Yorkshire stone, which is customarily measured according to Scotch method.
Sills, lintels, upstarts, architraves, and mullions.	Ditto, ditto.	Ditto, ditto.

TABLE VI.—*continued.*

DESCRIPTION.	METHOD OF MEASUREMENT.	
	Scotch.	English.
Hewnwork.		
Rebates and corners	At per rising foot, specifying size of stone and description of labour, and where part moulded, the girth of the plain work on the face, and to bottom of cheek of the ingoing to be stated, as well as the net girth of the moulding.	At per foot cube, labours separately.
Plain ashlar	At per foot super, allowing 3 in. for wall-hold at internal angles; 6 in. allowed for bevelled cuttings as at "pediments, skews, &c."	At per foot super, measuring the face and making no additions; cuttings taken at what they measure for labour, no allowance being made to the stone beyond what it measures.
Deductions for doors and windows in ashlar, with upstarts and pilasters of stone.	Full deduction of void and piers to be made less 1 ft. in width, which is understood as an "allowance for headers at ingoing in ashlar work. The price of ashlar to include for headers in general surface."	Full size of opening deducted.
Ordinary cornices and other running mouldings.	Measured from extreme points at per lineal foot, the extreme lengths of returns at external and internal angles being taken as an allowance for mitres.	Stone and labours measured as before stated, and the mitres numbered, stating the girth of the moulding.
Special cornices, where there are numerous returns and coping to chimney stalks (when broad stones are ordered).	At per foot super, and labour to edge at per foot run, stating girth and description of work.	Ditto, York stone, measured as before described.
Steps	Numbered.	At per foot cube, labour being taken as before; York stone at per foot run.
Paving	At per foot super, making an allowance of 3 in. for every lineal foot of cutting at angles or circles.	At per foot super; no allowance made in stone for cutting; labour to cutting being taken separately at per foot run.

CHAPTER VI.

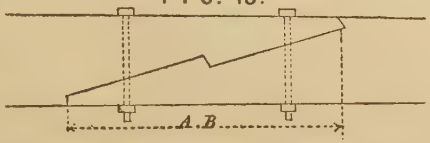
CARPENTER.

DIFFERENCE BETWEEN CARPENTERS' AND JOINERS' WORK—ALLOWANCE FOR SHRINKAGE—DISSECTION OF WORK—EXAMPLE OF—OPEN ROOF—LABOUR TO JOINERS' WORK, HOW TAKEN—FRAMED TIMBERS—FIXING—FLOORS—BOND TIMBER—QUARTER PARTITIONS—JOISTS—DOUBLE-FRAMED FLOORS—HERRING-BONE STRUTTING—DEDUCTIONS FROM FLOORS—SPRINGER FOR TRIMMER ARCHES—GIRDERS—OAK TRUSSES—BOND TIMBER—EXAMPLE OF—PLATES AND LINTELS—ROOFS, TRUSSES TO—KING POST TO—EXAMPLE OF—RIDGES AND HIPS—HIPS AND VALLEYS—CLEATS—COLLARS, &C.—CUTTINGS TO RAFTERS—IRONWORK TO—BOARDING OR BATTENING—EAVES BOARDING—TILTING FILLETS—DEDUCTIONS FROM ROOFING—ADDITIONS TO—GUTTER BOARDS AND BEARERS—EXAMPLE OF—DRIPS AND CESSPOOLS TO—TRAP-DOORS—LININGS TO—RIM TO—FASTENINGS TO—CEILING JOISTS—ROUGH BOARDING—GUTTERS TO FLATS—FIRRINGS TO FLATS—ROLLS FOR LEAD—BOARDING—BATTENING TO WALLS—SOUND BOARDING—EXAMPLE OF—WEATHER BOARDING—ARRIS GUTTERING—QUARTER PARTITIONS—OAK TEMPLATES—OAK CURBS—BRACKETING TO CORNICES—EXAMPLE OF—CRADLING—ANGLE BRACKETS—ANGLE STAVES—CENTERING—TO VAULTS—TO TRIMMERS—TO WINDOWS—TURNING PIECES—HOW TO MEASURE—LABOURS TO CARPENTERS' WORK—CIRCULAR TIMBERS—TABLE OF WORK.

IN measuring carpenter and joiners' work, greater care is required than with the trades already treated of, and the student must have a tolerable amount of practical knowledge of the different methods of framing timbers and joiners' work before he will be able successfully to undertake its admeasurement, particularly when taking off from the working drawings. The one great difference in the measurement of the works of the carpenter and joiner is this:—That in the former you measure the extreme length of the timbers, including the tenons; whilst in the latter this is not the case, the net superficial

quantity only being measured, the tenons being considered in the price. In scarfings and laps to timbers, the length of the scarf or lap would have to be added to the net length of the timber, and where the ends of the timbers are bevelled take the *full* length (see Fig. 18).

FIG. 18.



Make no allowance for shrinkage of timbers, but take the net scantlings. Where it is stated in the specification that the timbers are to bear the full scantlings when fixed, some surveyors make an addition to the material to cover the shrinkage. This is unadvisable, as the timber is presumed to be dry when fixed, in which case no allowance is necessary. Wherever an allowance is made, however, as it is difficult to get surveyors to give up their own adopted methods of measuring, it would be advisable to make a separate item of it, and describe it as an allowance to meet the shrinkage of timbers.

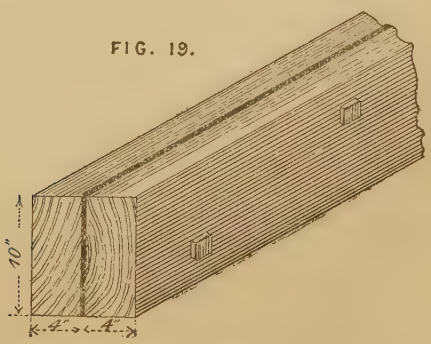
Dissect the work as much as possible, classifying it according to the nature of its execution, and describe briefly but fully the nature of the labour on the same. Where there is any labour executed on the material in carpenters' work: for example, to the timbers of an open Gothic roof, as planing, chamfering, &c., such labours would have to be taken out separately from the material and described as labour in planing to fir, oak, or as the case may be, or again, so many feet run of chamfer. In joiners' work the labour is generally described with the quantity, thus forming only one item instead of two or three, or even more, as is so frequently the case in the carpenter.

Where the timbers are *framed*, that is mortised and tenoned, they must be kept separate from the works that are only fixed, such framing necessarily entailing an additional amount of labour. In quantities, all works are understood to be *fixed*, unless stated to the contrary, and would include the labour in nailing, laps, dovetails, &c.

Floors.—Commence measuring at the bottom of the house, taking first the sleepers, then the wall plates and ground joists; afterwards take the bond timbers (if any), lintels, and wood bricks, to the lowest story, and lastly the quarter partitions. Having finished one floor in this way, proceed to the next, but always complete the one floor before commencing the second; otherwise, omissions are apt to take place which, by adopting this rule, are easily avoided. Proceeding then with what are termed *Naked Floors* (the flooring boards being taken with the joiner), take firstly, the sleepers and ground joists, the length by the scantlings. These must be taken separately from the joists of the other floors, and made a separate item of in the abstract and bill, they not entailing so great an amount of labour as the latter, consequently they will not bear so great a value. All other joists are measured in a similar manner, taking care in each case to include the portions inserted in the walls.

In double-framed floors it is customary to take the timbers bearing the greatest scantlings first. Where framed, as in girders, binders, trimmers, &c., they must be kept separate and so described.

FIG. 19.



Herring-bone and other strutting between the joists is measured at per foot run, stating the scantling and the description, no deduction being made for the intervening joists.

Make the necessary deductions for fire-places, staircases, &c.,

as they occur, and add for the additional width of the trimmers in each case.

Measure the feather-edge springer for trimmer arch of fireplace at per foot run, taking the length of the arch.

Girders sawn, reversed, and bolted, must be kept separate from the ordinary fir girder, on account of the additional labour thereon; and, again, greater labour still will be required where an iron flitch is inserted to fit the bolts, &c. The accompanying figure (No. 19) I give to assist the reader, and the better to exemplify my meaning. In the latter case the iron flitch is not measured in with the timber, the net amount of stuff only being taken.* Trussed girders must also be made a separate item of.

Oak trusses let into girders are measured by the foot run, and the labour, letting in screw bolts, fixing plates, straps, &c., are numbered; the ironwork being taken off at the same time, and afterwards abstracted and billed with the Smith.

Bond timber is now seldom used, being superseded by hoop iron, which is a great advance on the old system of building; the unsound uses of the old method in this particular are apparent. Where bond timber is adopted, it is measured the length by the scantling, adding for the laps and dovetails, and is described in the bill as bond timbers. As they are, or should be, carried through the openings in the walls, and have afterwards to be sawn off to the size of the opening, it is customary to make a deduction equal to half the width of the opening only, in order to allow for the extra labour in the sawing and waste.

Plates and lintels are also generally taken and described as bond timber, about the same amount and quality of labour being expended upon them. They are similarly measured. Many surveyors include the wood bricks for fixing joiners' work under the same heading, though, I think, incorrectly, the extra amount of labour in sawing the timber to the small sizes required and bedding same entailing an additional cost. I prefer, therefore,

---

* Thus presuming the length to be 16 ft., the timber would be measured thus:

2	16·0		Fir bolted in flitch girder.
	10		
	4	8·10	

in this case to advise the rule adopted by the other branch of the profession—viz. to number them and state the sizes.

Roofs.—Where trussed, take the truss first. All timbers comprising the truss—as tie beams, king post, principal rafters, and struts—must be kept distinct from the other portions of the roof, and described as "fir framed in trusses," in each case take the extreme length of each of the timbers, including all the tenons as before stated. If the tie beam is scarfed, add the additional length of timber required for this purpose to the net length of the beam as in Fig. 18.

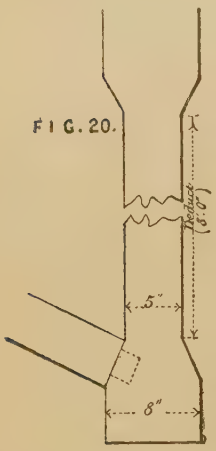


FIG. 20.

For the king post (see Fig. 20) the width must be taken where it is greatest, namely, below the shoulders, and a deduction made on one side only between the shoulders, the other side being allowed to pay for the cost of sawing and waste. After the truss take the purlins, which are measured as above. Then take the common rafters, dragging pieces, &c., and lastly, the ridge, hips, and valley-pieces, all to be reduced to the foot cube—this being the more uniform plan, though some surveyors take the last three items as a superficial dimension, and state the thickness in each case. At the same time as measuring the ridge and hips, take the ridge and hip rolls, when there are any, at per foot run, stating the diameter, and also state if spiked or otherwise.

Take a running dimension of the hips and valleys to allow for labour and waste in cutting, and describe it as "cutting and waste."

The cleats to purlins are usually numbered.

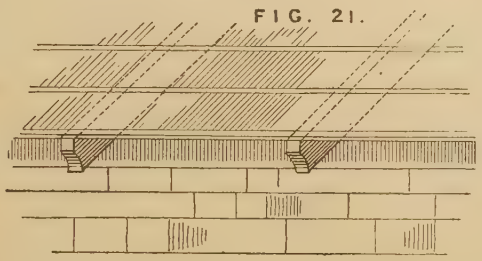
Collars, curbs, pole plates, &c., are measured as "fir framed in roofs."

Take the cuttings to end of rafters where visible at per number according to nature, giving sketch where necessary. (See Fig. 21, where one kind of end is shown.)

Measure the ironwork as it occurs, number the labour for fixing the same, and afterwards bill the ironwork with the Smith.

Boarding or battening for slate is measured the length by the

FIG. 21.

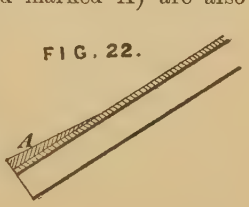


breadth, from the extreme edge of the rafter up to the ridge, and reduced to the square of 100 feet superficial, stating the thickness, as shown in the Table. In the case of battens it will also be necessary to state the distance between each batten, and its width.

Eaves boarding is measured by the foot run, and the width and thickness described.

Tilting fillets (shown in Fig. 22, and marked A) are also measured by the foot run, and the thickness stated.

FIG. 22.



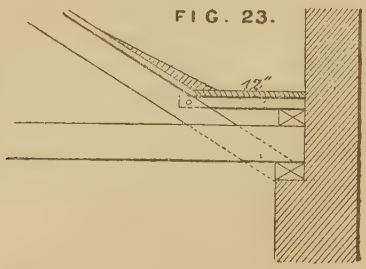
It is advisable in the two foregoing items to collect the whole of the dimensions on each roof, on waste, so that one dimension only need to be brought forward.

Make all the deductions where they occur for trap-doors, skylights, and chimney shafts, and at the same time make the addition for the trimmers, &c., not forgetting to include the tenons in the length.

Gutter boards and bearers (shown in Figs. 23 and 24) are measured by the foot superficial, taking the extreme length by the average width; but it is as well to state the greater and smaller widths, and show how you obtain the mean or average

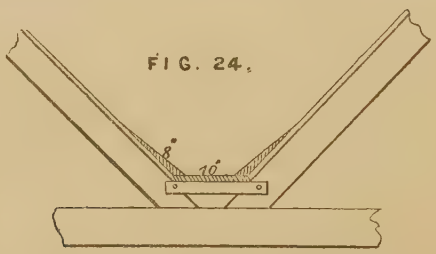
width on "Waste." State the thickness of the boarding. It is advisable also to state the sizes and particulars of the bearers when given in the specification; but this is so seldom done that surveyors, as a rule, do not specify them separately.

FIG. 23.



Where the bearers are specified to be framed, they must be described as such in the bill thus, "1-inch deal gutter boards and framed bearers."

FIG. 24.



Number the drips and cesspools, describing the latter as "extra to forming cesspool."

The following is the way these items usually appear in the Dimension-book:—

Greatest width of gutter		2·0
Smallest „		1·0
		2)3·0
Average		1·6
30·0 1·6	45·0	Inch deal gutter board and bearers.
		No. 3 Rebated drips.
		„ 1 extra to forming cesspool.

It is perhaps better, before taking the gutter bearing, &c., to take the trap-doors and linings where these occur. In so doing state the description of the linings, and in measuring them add to the length in the clear the thickness of the material for the framings. Collect the whole lengths of linings of each opening on waste, so as to have but one dimension for each, and they would have to be described thus:—"$1\frac{1}{4}$-inch deal wrought and splayed linings dovetailed at angles," or as the case may be. The rim would be taken at per foot run, and in describing same give the width and thickness, and state also whether dovetailed at angles.

For the trap-door take the width by the height, and state the thickness, and give the full description. Number the handles, bolts, and all fastenings appertaining thereto.

In measuring ceiling joists, take the length by the scantling, the same as stated for floor joists, making the deductions for chimney breast, &c., where they occur, and adding for trimmers as described for roof.

Rough boarding to flats, &c., is measured the length by the breadth, and valued at per square, as shown in the Table. It will be necessary to state the thickness and quality of the material, with description, stating how laid, whether the edges of the boards are "shot," or otherwise. Where any cutting is required, as to splays, irregular walls, &c., take a running dimension of the length, and describe it as "extra to cutting and waste." Where a gutter is formed in the flat, it is measured at per foot run, and described as "extra to forming gutter in flat"; also, number the cesspools as extra, as before described to other gutters.

Firrings to flats, &c., are measured superficially, taking the area of the flat as shown in the Table.

Rolls for lead are measured as shown in the Table, stating the diameter of the roll. Short rolls in gutters are generally numbered.

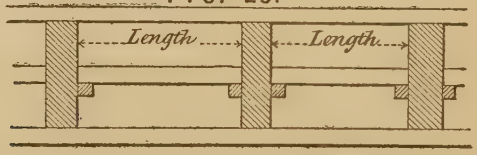
Boarding, where laid against walls or to ceilings, must be kept separate from that laid flat, more labour being entailed when upright or against ceilings, than when laid flat.

Battening to walls is measured superficially, the length by the

height. State the thickness of the material and the method of securing to the wall, whether plugged or otherwise, according to the nature of the backings.

To measure *sound-boarding*, take the length by the width of the space between two joists, and multiply this dimension by the number of such spaces in the room where such sound-boarding is required to go. It will also be necessary to describe the fillets which are included in this one item, and to state whether they are single or double. It is wrong to measure sound-boarding as some surveyors do, viz. by taking the entire area of the room, and making no deduction for the joists, as before stated. Whenever it is done in this way, as it is difficult to get a surveyor to alter his adopted methods of measuring, it should also be stated that the timbers have been measured in. The Fig. 25 illustrates this item.

FIG. 25.



Weather boarding is measured similarly to rough boarding, stating whether edges rough, splayed, wrought, or wrought and beaded, &c., the net area of the surface only being taken.

Arris guttering is generally measured by the foot superficial, and water tanks by the foot lineal.

Quarter partitions are measured by the foot cube, taking first the lengths of the several timbers, and then stating the scantlings. Take the timbers of the largest scantlings first, as the head and sill, including the portions let into walls, then the door-posts and head, the braces, and lastly the quarters, taking care to make the deductions for doorways where they occur. The cubes are then added together, and the sum of the whole is brought into the abstract in one item, and billed as "fir framed in partitions." Where the partition is trussed, it must be described as "fir framed in trussed partitions." The student must not forget, as previously stated, to include in both cases

the tenons, and care must be taken not to omit any ironwork in connection with the partitions, as bolts, &c., which should be taken out at same time, and afterwards billed with the Smith.

Oak templates are generally numbered, stating the dimensions each way.

Oak curbs are also measured by the foot cube; take the length by the scantling and add for the laps.

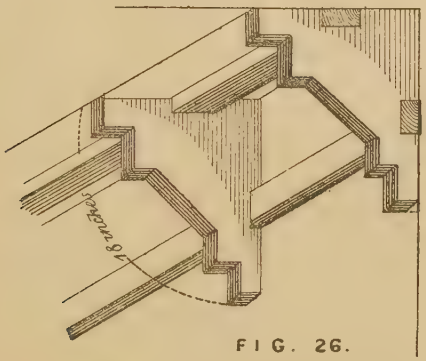


FIG. 26.

In measuring *bracketing to cornices*, &c., take the length by the girth of the moulding, making a superficial dimension, and specify the thickness of the deal used, and how secured to the wall. To obtain the proper length, it will be necessary to make a deduction on the length of each wall of the width of the projection of the bracket, which will give the average; or the better way would be to deduct four times the width of the projection from the collected lengths of the walls of a rectangular room. For a sketch of ordinary bracketing, see Fig. 26. If to circular ceiling, state so, and do not measure it twice, as some surveyors do, and call it all "straight."

Cradling for entablatures is taken in a similar manner—according to the thickness of the material.

All angle brackets are taken with the others, and afterwards billed again as *extra* only to angle brackets.

Angle staves are measured by the foot lineal, taking the net length.

Centering—to vaults, groins, &c. Take the length by the girth or circumference of the under side of the arch, which will give a superficial dimension. This is brought into the square of 100 feet, as stated in the Table, and is valued as such for use and waste. It is customary to measure centering to all vaults, although many of them may be of the same size, and the centering of one does for some of the others, in which the additional time in removing it for the other arches might be made an "extra" of.

Centerings to trimmer arches are measured the length by the girth.

The centres to windows it is advisable also to measure by the foot superficial, taking the girth by the width of reveal, and stating the nature of the curve, whether semicircular, pointed, &c.

Turning pieces to flat arches are taken at per foot run, stating the width of reveal, and including struts.

No centering is taken to the arches over fire-places where chimney bars are provided (they not being necessary). Where there is no chimney bar, they must of course be provided.

There is a difference of opinion as to the measurement of centering to arches of windows, relieving arches, &c., some preferring to take them at per number, and average the openings, keeping the different widths of soffit separate; so having one item for the 4½ inches, another for the 9 inches, and so on—but, of course, keeping at the same time the different arches separate, thus, the semicircular from the Gothic, pointed, &c.; but I think it better to follow the course I have laid down, and measure all by the foot superficial.

Labours.—All labours, on whatever class of work in connection with the carpenter, should invariably be measured at the same time as the material, otherwise it will be almost impossible to prevent inaccuracies occurring, and it will save a considerable amount of time. The labour on carpenters' work is generally confined to planing, splays, chamfers, rebates, &c., the sawing of timbers being of course always understood to be included in the price. Planing fir is measured by the foot superficial, also the labour to splays when over 6 inches wide. Chamfering is

measured by the foot run, and the stops numbered according to the description, whether straight, splayed, moulded, &c., although this is more within the province of the joiner than the carpenter. Rebates, beading, &c., are also measured by the lineal foot.

It may perhaps be as well to observe, in concluding the Carpenter, that circular timbers are generally measured at per foot run, stating the scantlings, and if any labour is executed on the same, it is as well to include it in the item, and not keep it separate from the material, as stated for straight work, as the labour being circular, it is better kept with the material, the builder being better able to form an estimate of its cost when knowing what it is for. Otherwise it would have to be abstracted separately, and described as to circular work. All additional lengths for scarfing, &c., must be added as before. It will be also necessary to state the radius. An example of a circular rib to a Gothic roof will be found in the Table annexed. Number the framed and mitred angles where they occur, and also the intersections, stating sizes in each case as shown. When the curve is other than circular it must be so stated.

Table VII.

This Table has a double use ; it shows the order of taking this Trade, and the method of Measurement.

Fir in plates, lintels, and wood bricks	At per foot cube.
Ditto in ground joists and sleepers	,,
Ditto in girders	,,
Ditto ditto sawn, reversed, and bolted	,,
Ditto fitted and bolted to iron flitches	,,
Ditto framed in roofs	,,
Ditto ditto in floors	,,
Ditto ditto in quarter partitions	,,
Ditto ditto in trusses	,,
Oak in templates	,,
Ditto in curbs	,,
Centering to vaults and arches	At per square of 100 ft. super.
Ditto to trimmers	At per foot super.
Ditto to segmental arches	,,
Ditto to semicircular arches	,,
Ditto to Gothic pointed arch	,,
Ditto ditto with splayed soffits	,,
¾-in. battening, 2½ in. wide, for countess slating	At per square of 100 ft. super.

¾-in. rough eaves board	At per foot super.
Ditto ditto boarding jointed for slates	At per square of 100 ft. super.
Ditto ditto boarding edges, shot, and firrings for flat	,,
Ditto ditto valley boards	At per foot super.
Ditto ditto sound-boarding, with single fillets	At per square of 100 ft. super.
Ditto ditto with double fillets	,,
Labour planing to fir	,,
Inch rough boarding	,,
Ditto ditto bracketing for soffit	At per foot super.
Ditto ditto gutter boards and bearers	,,
Ditto ditto weather-boarding, with splayed edges	At per square of 100 ft. super.
Ditto wrought ditto	,,
Ditto ditto one side and V-jointed batten boarding plugged to walls	,,
Inch deal matched and beaded boarding to ceiling	,,
Ditto deal wrought and ledged trap-door	At per foot super.
1¼ ditto ditto and splayed linings dovetailed at angles	,,
Splayed cutting and waste to ¾-in. boarding	At per foot run.
Tilting pieces	,,
Springing piece to trimmer	,,
Labour to rebates	,,
Ditto to chamfer	,,
Turning pieces to arches 4½ soffit	,,
Stout rough fillets nailed to girders	,,
2 deal rounded roll for lead	,,
Herring-bone strutting	,,
1½ in. × 9 in. cut and stopped chamfered barge board	,,
10 in. × 4 in. circular wrought ribs to ceiling screwed up in two thicknesses, framed and chamfered on 2 edges	,,
Fir cleats to purlins	At per number.
Rebated drips in gutter	,,
Extra to dovetailed cesspools in gutter	,,
Oak templates 2 ft. × 9 in. × 6 in.	,,
Mitred intersections of circular ribs, 10 in. × 4 in.	,,
Framed and mitred angles to 6-in. ribs	,,
Fixing screw bolts to flitches—*extra to*	,,
Ditto to principals	,,
Ditto straps with 2 bolts each	,,
Ditto king heads to trusses	,,
Ditto shoes to feet of principals	,,

I have thought it easier to keep this trade separate from the Joiner, although in a small job this is not always done.

CHAPTER VII.

JOINER AND IRONMONGER.

DISTINCTION BETWEEN CARPENTER AND JOINER—DIFFERENCE OF MEASUREMENT—ORDER OF PROCEDURE—FLOORS—DEDUCTIONS FROM—BORDERS TO HEARTHS—SINKINGS FOR MATS—IRREGULAR-SHAPED ROOM—SCRIBING TO WALLS—SKIRTINGS—GROUNDS TO—ANGLE, &C.—MOULDING PLANE—SASHES AND CASED FRAMES—EXAMPLE OF—SASH FASTENINGS—CIRCULAR SASHES—FIXED SASHES—FRENCH CASEMENTS—CIRCULAR HEADS TO—WINDOW LININGS—WINDOW BOARDS—SPLAYED LININGS—FRAMED GROUNDS—EXAMPLE OF—ARCHITRAVES—WINDOW BACKS—EXAMPLE OF—CAPPING TO—ELBOWS—BOXING SHUTTERS—BACK FLAPS—BACK LININGS—SHUTTER BOXINGS—SLIDING SHUTTERS—DOORS—LEDGED—WITH GOTHIC HEADS—SASH—EXAMPLE OF—CLASSING DOORS—DOOR FRAMES—EXAMPLE OF—OAK SILLS—JAMB LININGS—EXAMPLE OF—FRAMED DOOR GROUNDS—EXAMPLE OF—ARCHITRAVES—DADOS—PLINTH TO—PILASTERS—COLUMNS—CARVING—FRAMED PARTITIONS—DOORS IN—CUPBOARD FRONTS—SPANDREL FRAMING—SHOP FRONTS—FASCIATE—BRACKETING FOR CORNICE—PUTTY COMPOSITION—SHOP SHUTTERS—REVOLVING SHUTTERS—WORK TO—STAIRCASES—EXAMPLE OF—EXAMPLE OF HOUSING—STRINGS—LININGS TO WELL HOLES—HANDRAIL—IRON CORE—NEWELS—IRON NEWELS—BALUSTERS—ORNAMENTAL IRON BALUSTERS—CLOSET FITTINGS—KITCHEN DRESSER—SINKS—ORDER OF TAKING LABOUR—OAK OR MAHOGANY—FRENCH POLISHING—IRONMONGERY—TABLE OF WORK.

HAVING completed the Carpenter, I proceed now to treat of the Joiner, with which is usually incorporated the Ironmonger. I have thought it advisable to keep the Carpenter and Joiner apart from each other, so as to make the subject less complicated than it otherwise would be. The great distinction between the two trades is, that whereas the former is engaged on what is commonly termed the carcase of the building, the other is employed on the internal fittings and finishings. In

the one case the labour would be ordinarily small in comparison with the material, whereas in the latter the reverse is the case, and the labour consequently requires more minute description than in the Carpenter. I have already stated the difference of measurement between them, and I would repeat that in the Joiner the net superficial quantity *only* of the material is measured (except in certain cases, to which I shall hereinafter allude), all tenons, &c., being considered in the price.

In the Joiner I would advise the same course of procedure as in the preceding trade—namely, floor by floor, completing one floor before the second is commenced. Begin with the flooring, then take the skirtings, next the windows and doors, staircases, &c. &c., as will be shown, taking the ironmongery as it occurs. Proceed then with the

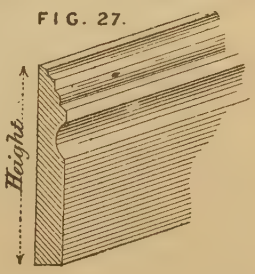
Floors.—Take the length by the width from wall to wall (including skirting), and add for all the additional pieces of flooring, such as filling into recesses, windows, &c. Give the thickness of the boards, and a description of the material, with the method of laying same, whether straight joint, folding, dowelled, or otherwise. It is also necessary to state the width, or gauge, of the boards, specifying whether batten, or as the case may be. Make the deductions for all projections, well-holes, &c., also for the slabs to fire-places, though many surveyors make no deduction in the latter case, but allow it as an equivalent for the additional labour in putting a mitred border to the slab; but where no mitred border is provided, however, they deduct it. It is best, however, to make this deduction in either case, and then to take the border separately; but it having been already measured in with the flooring, it would only be described as "extra to glued and mitred border to $1\frac{1}{4}$-in. flooring," or as the case may be, the item being a "running" one, taking the extreme dimensions each way for the length; the width of the border, not being necessary, is not given, but the thickness of the flooring must be stated. Take a measurement where special features occur, as for sinkings for mats, &c., such measurements being described as "extra to sinking in floor for mat," or as the case may be; and if mitred border be provided round the same, take it as described to slabs. Where the room is

irregular, it will be necessary to ascertain the average size of the flooring, so as to arrive at the net area, and make an allowance for all irregular cuttings, taking the length by a width of 3 in. for the cutting and waste.

Scribing flooring to walls is measured by the foot run, stating the thickness of the floor, and is described as "Scribing (inch) floors to walls." Enumerate any notchings.

Skirtings.—Collect on "Waste" the lengths of the several walls, making the deductions for doors, chimney-pieces, &c., and bring the total length of skirting to each room, forward in one dimension only. It is customary to measure them at per foot run, stating the height, thickness, and the description. Also state if the backings, or grounds, are intended to be included in the one item. If the grounds be taken separately, they are measured by the foot run, stating the length only, and are described as "narrow skirting grounds." It is also advisable to state how the grounds are secured to walls, whether plugged or otherwise. Number all the angles to the skirting, stating whether "mitred" or "tongued"; also the housings into architraves, &c., and any returned ends. These items should in each case be abstracted and billed immediately after the different descriptions of skirtings to which they relate, as by this means labour is saved and an estimate is the better formed of their value, as it can be easily seen to which they refer, and the amount of labour necessary in executing them. If billed among the "Numbers," it will be necessary to state the height and thickness of the several skirtings to which each of them has reference; also whether moulded skirting, or otherwise. In measuring skirtings it is always advisable to give a sketch (I give sketch; see Fig. 27) where it is anything beyond the common mould, and even then it is preferable, as, should it be able to be prepared without making a new moulding plane—that is, should the builder have the plane in stock, he will estimate less for it than where

FIG. 27.



he does not know the character of the moulding, an addition always being made sufficient to cover the expense of a new moulding plane. This is trifling in itself, but may be worthy of note by many quantity surveyors.

Sashes and Cased Frames are measured together as follows:— Take the measurement between the pulley stiles, and add 4 in. on each side (being the width of the frame) for the total width. For the height, take from the top of the oak sill to the under side of the head of the frame, and add to this dimension 7 in.— 4 in. being for the head, and 3 in. for the sill. This calculation would in each case be carried out on "Waste," so that the one dimension need only be brought forward for each sash and frame; thus:—

Width between pulley stiles	3·0
Add for frame, two 4 in.	8
Total width	3·8
Height between head and sill	6·0
Add for head and sill	7
	6·7

3·8		
6·7	24·2	Deal-cased frames, oak sunk and weathered sills, and 1¾ in. deal moulded sashes, double hung, with patent sash-line, brass axle pulleys, and iron weights.

It is always necessary that a full description should be given, as above, stating the thickness and description of the sashes, and the description of sash line, pulleys, and weights. It is also necessary to state whether the sill is oak or otherwise, and the labour on same, whether sunk, weathered, &c. The sash fastenings are taken separately and the description given.

Where the sashes and frames have *circular heads*, it is customary to measure the portion that is square (that is, up to the springing line) and to abstract it with the foregoing, but to take the circular head separately, measuring it as if square, taking the greatest dimensions each way, with the allowance for head and width as before expressed to ordinary sash-frames, and to make a separate item of it, describing it as "circular head to sashes and frames, measured square." Or another way

is to measure the whole sash and frame as if square, and take the circular head separately, and describe as "extra only to circular head to sashes and frames, measured square." This I think preferable, and I have so described it to be taken in the Table. Where sashes and frames are *circular on plan*, it is necessary to take the girth instead of the net width, with the same allowances as for straight sashes; and they require to be separately described as "circular on plan," in addition to the ordinary description. Should they be described as "*circular circular*," that is, circular on plan and circular in elevation, it will be necessary to keep the portion which is "circular circular" separate from that which is only circular, measuring, as stated, to circular-headed sashes and frames; and they would consequently be described as "extra only to circular heads to circular sashes and frames, measured square," and would follow in the bill immediately after the circular sashes and frames. Where the thickness of the several members of the frame, as hanging stiles, parting bead, &c., are beyond the ordinary, it should be so stated in the description.

Where the sashes are fixed, they are measured similarly to those that are hung, the only difference being in the description.

French Casements are measured the net dimensions of the casements exclusive of frame, and described according to the thickness and workmanship. Where the casements are rebated, the dimensions must be taken to the extreme of the rebate each way. The frame would be measured and described as "cube fir in wrought, rebated, and staff-beaded casement frames," or as the case may be. Be sure in the measurement for the frame to add the tenons. Transoms and mullions are also measured solid and described. Sills are taken at per foot cube. If patent or other water bar is specified, measure it at the same time. State how the casements are hung, and generally describe the same fully. *Sashes fixed or hung on centres* with solid frames are similarly treated.

The method of measuring circular heads to casements will be described hereafter, in treating of door frames.

Window Linings.—After the sashes and frames, proceed to measure the linings, taking them the net length shown, and

adding for the passings, for the one dimension ; and the width forms the other. State the width and give description. The labour to the groove, when they are grooved, is generally taken separately. It will form a running dimension, the length being the same as that for the linings.

Window Boards are measured by the foot superficial, taking the length by the breadth ; and when they are grooved into the sill, the labour to groove should be taken separately, as described to the linings. If the sill be of oak, it must be described as "labour to groove in oak," as, necessarily, greater labour would be entailed than if executed in fir. Give the description of the window board, firstly stating the thickness ; and where the corners are rounded and returned, it is customary to number them as "returned and rounded ends to window board," and if the boards are notched, this must be stated in addition.

Where the window linings or window boards are on the splay, it will be necessary to keep them separate from those on the square.

The *Framed grounds* are measured the extreme length each way, that is, taking the dimensions on the outer edge both for the height and width of the window ; or another way is to take the *net* height and width of the jambs, and allow four times the width of the grounds to allow for the framings ; both results being of course the same. The latter I think the preferable, the collections for length being made on "Waste," thus :—

Height of jamb	6·0
Ditto	6·0
Length of head	4·0
Framings, 4·4 in.	1·4
Total length	17·4

This is brought into the dimension column and the width stated. Also, specify the thickness and description, thus :—

17·4		
4	5·9	Inch deal framed grounds.

Architraves.—Measure the architrave mouldings by the foot lineal, and specify the girth of the moulding. (See Fig. 28.) The round of the moulding is taken along the outer edge for the length. Number all the mitres and state the girth of the mouldings to which they refer, as will be shown hereafter in the Table. Some surveyors take the mouldings where over 4 in. girth by the foot super, but I prefer to measure all by the foot run for the sake of uniformity. Any pateras at the angles must be numbered, as also plinths where they occur, as, for example, to stop the skirting where it projects beyond the face of the architrave. Should the moulding to skirting be carried round window to form architrave, as is sometimes the case, do not omit to take the additional mitres.

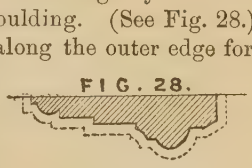


FIG. 28.

Window backs are measured the length by the height, the latter being taken from the floor to the under side of the capping. In addition to the visible length, it will be necessary to add the thickness of the framing on each side. Thus, if the visible length of the back be 4 ft. 0 in., and the thickness of framing $1\frac{1}{4}$ in., we should collect on "Waste":—

Length	4·0
Two Passings	$2\frac{1}{2}$
	$4 \cdot 2\frac{1}{2}$

by which means we obtain the total length. State the thickness of the framing and give a full description of the workmanship. The capping is taken separately at per foot lineal, and described according to the nature of the work upon it. The following is an example of how these would appear in the Dimension-book, the length being ascertained on waste as above:—

$4 \cdot 2\frac{1}{2}$		
1·6	6·4	$1\frac{1}{4}$ in. deal moulded and framed two-panel window back.
4·0	4·0	Deal beaded capping.

The elbows are measured similarly to the window backs, taking the extreme widths, including the passings, for the one

dimension, and the same height as the back (viz. to under side of capping) for the other. The soffits are also measured the full dimensions each way. Describe how they are finished, whether splayed, plain, keyed, or framed in panels; and, if the latter, the number of the panels, and whether moulded or otherwise. The caps to elbows and clearing-pieces are numbered. The labour to splayed ends is measured at per foot run, as shown in the Table.

Boxing shutters are measured by the foot superficial, taking the height by the extreme width, including all the rebates. State the thickness of the shutters and description of framing; also state the number of heights in which they are hung, if more than one. Back flaps are also measured in this manner. Number all the ironmongery as it occurs; also the holes cut for the shutter bars.

In measuring the back linings, add 2 in. to the height of the shutter for the length; take this by the width, and state the thickness and description. If grooved, take a running dimension of the groove for labour. Shutter boxings are measured the height by the width, including all the framings; and state the thickness and description, whether "proper" boxings or otherwise—proper boxings being wrought, framed, rebated, splayed, or beaded.

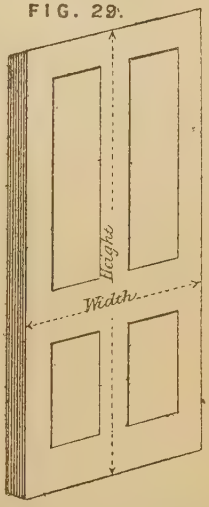
Sliding shutters are measured by the foot superficial, stating the thickness and description of the framing, and also the hanging, &c., as to sashes and frames. The flap to cover the same is measured by the foot run, if under 6 in. wide. Number the ironmongery.

Doors.—Measure the width by the height, stating the thickness of the framing and the number of the panels; also the mode of finishing, whether bead-butt, moulded, &c.; and if the panels are raised, or are completed differently to the ordinary, it must be so described, as it is necessary, as I before stated, that the description should be full and explicit. In all cases, take the description from the specification, when working from one. Where the doors are double, and are hung folding, the width of each door must be taken to the extreme edge of each

rebate. If the doors are hung with rising butts, state so, as it will necessitate the head lining and the top rail of door being splayed, as shown in Fig. 29.

In measuring ledged doors, it will be necessary, in addition to the net thickness of the door, to state separately, the number and sizes of the ledges, and to note whether the boarding is wrought, ploughed, tongued, and beaded, in which case they are designated as "proper ledged doors," such description rendering further description unnecessary. Should the boarding, however, be differently finished, it will be necessary to describe it as it is worked. Where the doors have circular heads, the course usually adopted is to measure them as square, taking the full height and width, but specifying them as "doors with circular heads." Gothic heads, and heads with quadrant corners, are similarly measured, but each kept separate, and so described. A sketch is generally advisable in the two latter cases, as it greatly facilitates matters by the better exemplifying the true shape and character of what is intended. Sash doors are measured as above, and it is customary to measure with them the shutters, where these are provided, taking the length by the height, including the rebates where any are provided, and describing the method of framing, whether bead-butt and square or otherwise. Where a rim is necessary for the support of shutter, measure it by the foot run on the outer edge, and describe it as "wrought, rebated, and moulded rim," or whatever it may be. After you have completed measuring the door, take the hinges, locks, bolts, and fastenings, giving the sizes and description in each case, so that one door may be completed before commencing a second; and the same with the lifting shutters, numbering the stubs and plates, shutter lift,

FIG. 29.



and thumb-screw fastenings. In the case of entrance doors, all the additional fastenings, as knocker, knob, door chain, &c., would be taken off with the door in like manner.

Where a number of doors occur of the same size, it will not be necessary to repeat the dimensions, but the number of times the item occurs should be placed to the left of the dimensions, as stated previously; but as it is advisable not to confound the articles on one floor of a house with those on another, they should be kept separate, and yet be included in the one dimension. To explain this, supposing we have seven doors of a given dimension (say 3 ft. by 7 ft.) on the ground floor, and an equal number of the same size and description of door on each of the second and third floors, this could appear in the Dimension-book in either of the following ways (the total of the doors would be 21):—

			A.
21	3 · 0 7 · 0		2 in. deal four-panel square door.
			Or B.
3/7	3 · 0 7 · 0		2 in. deal four-panel square door .
			Or C.
7·7·7	3 · 0 7 · 0		2 in. deal four-panel square door.

Example A, I have already explained; in example B, the dash between the 3 and the 7 signifies that the latter figure occurs three times, and consequently denotes the multiplication of those numbers. In example C, the dots denote the addition of the numbers between which they are placed. Both the examples B and C frequently occur in taking off quantities, B being used where the same quantity is repeated, and C more usually where different numbers of the same article are to be added. In the example given, B would be employed; but supposing the number of these doors on the 1, 2, and 3-pair floors to be respectively 10, 5, and 6, we should employ the mode adopted in example C, that of B being of course inapplicable; and the example A not being advised except where the article is all on one floor, as previously stated.

In measuring the door frames, take the height of the door, and double it for the two sides, and include on each side the tenons into the head, and an additional two inches on each side for stubbing into the sill; add to this the width of the door, and twice the thickness of the frame, and an additional six inches for the horns. The whole of these dimensions must be collected on "Waste," and the total brought forward and the scantling stated, with full description of the work. Wrought, rebated, and beaded frames are usually termed "proper door-cases." To give an illustration of the above method, take a door 3 ft. 6 in. by 7 ft. 6 in., the scantling of the frame being 4 in. by 4 in. :—

Height of door for one side	7 · 6
ditto other side	7 · 6
Add for two tenons	8
Ditto two stubs	4
Width of door	3 · 6
Two thicknesses of frame	8
Extra width for horns	6
	20 · 8

20 · 8		
4		
4	2 · 4	Fir proper door frame.

It will be seen from this that the measurement of door frames is similar to the measurement of the timbers in the carpenters' work, inasmuch as all tenons, &c., are added to the net dimensions. Many surveyors, for this reason, take it off and abstract and bill it with the Carpenter; but I think that as it is actual joiners' work, being prepared at the bench, it is better to take it off with this trade, it being advisable always to affix the various items to the various trades by whom they are severally prepared. When the head is circular it must be kept separate, and described as "To circular head of door frame." Where there is a transom, it is measured in with the door frame (being, in fact, part of the frame), if it is similarly worked; if it is differently worked it must form a separate item, and is in this case better measured by the foot run. In either case, the tenons must be included in the measurement for the length.

Oak sills are measured and kept separate from the frames, and the description of the labour upon the same must be stated,

whether wrought, weathered, framed, &c. In measuring them, take the length by the scantling, and bring all to the foot cube, the greatest dimensions being taken each way.

Jamb Linings, &c.—The following is the method of measuring jamb linings (see Fig. 29). Take twice the height of the door for the two sides, to which add the width of the door for the soffit, and add for the passings four times the thickness of the linings,—thus, supposing the jamb linings to be 6 in. wide and $1\frac{1}{4}$ in. thick (door 7 ft. by 3 ft.), collect on "Waste" :—

Height of door for one side	7 · 0
Ditto other side	7 · 0
Width for soffit	3 · 0
Four times thickness ($1\frac{1}{4}$ in.) for passings	· 5
	17 · 5

17 · 5 · 6	8 · 9	$1\frac{1}{4}$ in. deal double-rebated and double-beaded jamb linings.

To obtain the width of the jamb linings add to the thickness of the partition the thickness of the door grounds on "Waste," thus :—

Partition	$4\frac{1}{2}$
Two grounds	$1\frac{1}{2}$
	6

It will be necessary to describe the nature of the work, whether single or double rebated, beaded, &c. &c.; and where dovetailed or other blockings are provided for hinges and lock, they must be numbered and described as "extra to." Where the linings are tongued to door frames, they must be kept separate from the other linings, and described accordingly.

Framed door-grounds are measured as follows :—To the total of the jamb linings add four times the width of the grounds for the passings, and state the thickness. Taking the example just given, and presuming the grounds to be 4 in. wide, we obtain

Jamb linings	17 · 5
Four times 4 in. for passings	1 · 4
	18 · 9

18·9 ·4	6·3	$\frac{3}{4}$ in. deal framed grounds.

The labour must be described according to the nature of its execution.

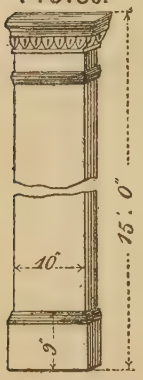
Architrave mouldings are measured by the foot run, stating the girth and numbering all the mitres, and stating the girth of the mouldings, as explained to windows.

Dados.—Measure the dado by the foot superficial, taking the extreme length by the net height, and state the thickness. It will also require to be described, whether simply ploughed and tongued, wrought one side, or whether framed in panels, &c. &c.; and if framed in panels, the nature of the framing. Also state the nature of the backings, and whether they are intended to be included in the one item. It is customary to measure base and surbase mouldings, where over 6 in. girth, by the foot superficial—under that, by the foot run. State the nature of the moulding in each case, and girt it for the width, including the rebates. Number the mitres, housings, &c. The plain plinth would be measured by the foot superficial, taking the extreme dimensions for length and height, including tenons and housings, the mitres, housings, &c., being numbered as described to skirtings. Where the dado, &c., is circular, so describe the several items, and keep the circular portions separate from the straight. Intersecting mitres should also be kept separate from the ordinary. Moulded plinths are measured the same as those described to the dado, taking the plain part first; the extreme length by the height, including housings, rebates, &c., the thickness and description being stated; also state whether backings are included in the one dimension, if not, they must be taken separately at per foot run, as described to skirtings. Girt the moulding for the width, taking the same length as to plinth—when over 6 in. girth, they are measured by the foot superficial —under that, by the foot run. Number mitres, housings, &c., and if the work is circular, describe it as stated to dado.

Pilasters (Fig. 30) are measured by the foot superficial, collecting the round or girth of the pilaster for the width. Thus, if face be 10 in. wide, and the returns 2 in. each, the

width would be taken as 14 in. Take the height from the floor to the top of the capping. Describe the nature of the work fully, and the thickness of the material, stating whether framed, or otherwise.

FIG. 30.



Take the mouldings to capping and necking and to plinth separately, by the foot run, numbering the mitres. The plinth would be measured in with the pilaster. It would therefore only be necessary to add for the projection. The mouldings to panels, where any, would be included in the description, and not be separately measured.

Columns are measured by the foot superficial, taking the height by the girth, and stating the diameter. Give full description, stating whether glued up in narrow widths and closely blocked, or as the case may be; also whether the column is straight or diminishing. Measure the caps and bases separately, and state whether glued upright and blocked for turning, or whether glued parallel, or in thicknesses, &c. Measure the grooves as to necking by the foot lineal, also any fluting in like manner, numbering the stops. Any carving to caps would have to be taken separately, and the caps numbered according to size, stating the nature of the carving.

NOTE.—Some carvers take four times the diameter of the shaft of the column measured under the necking, for the circumference of the cap. This method, in my opinion, is not satisfactory. It is better to give a sketch figuring the height and diameters.

Framed Partitions are measured superficially, taking the length by the breadth, and stating the thickness. Give full description of the work, whether square, moulded one or both sides, &c. &c., and number any angle-irons for securing the same, &c. The doors in same are measured in, and the dimensions of the door again taken separately, and described as "extra labour to doors in do." Run the fillet round door, taking the dimensions round the outer edge, and describe it. Circular corners are measured by the foot run, and described as "extra."

Cupboard Fronts are measured similarly to framed partitions, the doors in same being also described as "extra."

Spandrel Framing to stairs, &c. (see Fig. 31), is measured

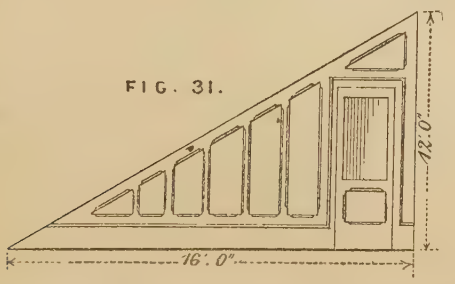


FIG. 31.

net, to obtain which the length is taken by the full height and halved thus:—

½	16·0 12·0	96·0	1½ deal, wrought both sides, and stop-chamfered spandrel framing.

The thickness and description must be stated, as shown in the example. Measure the doors in as described, to partitions, and afterwards charge the additional labour on the same as an "extra." Take all fastenings to doors at the time of measuring them.

Shop Fronts.—Measure the stall-board by the foot lineal, stating scantlings and the nature of the labour on the same; also transoms and any other timber, stating fully the method of finishing. The lining under stall-board, the show-board, and lining under, are measured superficially, stating the thickness and quality of the material and workmanship. Note any trimmings for basement lights, and make the deductions and additions for the same where they occur. The shop-sash is measured by the foot superficial, taking the extreme dimensions each way; state fully the nature of the work, and the thickness and quality of the stuff, how secured,—whether guard-bead outside and shifting beads and brass screws and collars inside, or whatever way may be adopted. Also state the number of lights.

The measurement of the door would be the same as already described to other doors.

Take the fascia by the foot super, and also any linings to breastsummer, story posts, &c.

The measurement of bracketing for cornice has already been described in the Carpenter.

It is also customary to measure with the Joiner any putty composition, including the fixing in wood framing, taking it at per foot run, stating the width and nature of the mould, and whether straight or circular,—all mitres being numbered.

Shop shutters are measured by the foot superficial, taking the net dimensions of the whole surface for rebated shutters, and stating the thickness and nature of the framing. Number all ironmongery as it occurs.

Patent iron, or wood, revolving shutters, are also measured by the foot super. Take care, at the same time, to make a provision for attendance, in all trades, in assisting to fix the same, including cutting away the stone or other work, where necessary, and for additional movable casing, &c., as may be needful for access to the gear.

Staircases.—In measuring staircases take firstly the length of the tread, including the housings into strings, for the one dimension, by the height of riser, *plus* the width of tread for the other, the extreme dimensions being taken in each case. This will give the dimension for one tread and riser, which will have to be multiplied by the number of such steps. Presuming we have ten fliers 3 feet long, as sketch (Fig. 32), they would appear in the Dimension-book thus :—

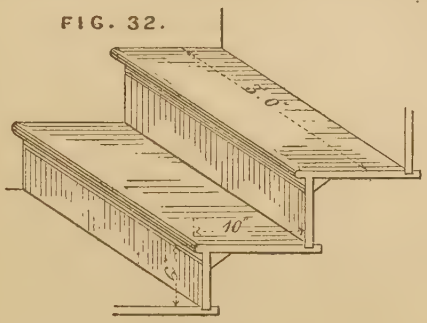
		in.
Width of tread	.. ..	10
Height of riser	.. ..	6
		1·4

10	3·0		1½ in. deal treads with moulded nosings, and
	1·4		1 in. deal risers, upon strong fir carriages;
	—	40·0	and glued, blocked, and bracketed.

State the thickness of the tread and riser as shown in the example given, and also how the nosing to tread is to be finished, whether rounded or moulded; also if it is to be returned round

the step. It is advisable to give the sizes and number of the carriages under stairs, where stated in the specification; but

FIG. 32.



this is very seldom done, they being in great measure left to the option of the builders.

Where the steps are mitred to string it is necessary to state so, and also whether the treads are glued and blocked. If the risers are tongued at each edge, measure the grooving and tongueing by the foot run; also specify if the winders are feather-tongued. Where the bottom step is finished differently from the others, as a curtailed or bull-nosed step, it will have to be kept separate, and numbered according to the description. Where a nosing is run on the floor, as to the top step, it must be taken and described as "—feet run of deal moulded nosing on floor to form upper step." The riser in this case would be measured in with the stairs.

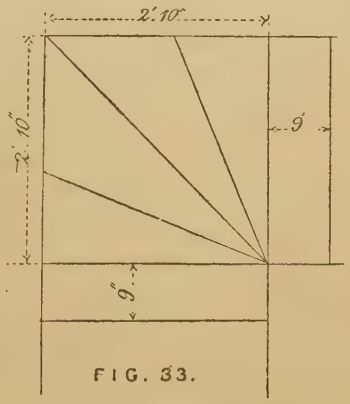


FIG. 33.

In measuring the winders it is customary to take the entire space occupied by them, whether quarter space or otherwise, adding to the width an additional inch for the pro-

jection of each nosing, and collecting the heights of the several risers. Thus :—

Tread	2·10
Housings	2
2 Nosings	2
	3·2

3·2		
3·2	10·0	Feather-tongued winders.

It will be necessary to add to this dimension that for the risers, so that both the treads and risers in winders may be abstracted together. In this case as the risers are of different lengths they must be collected on "Waste," and the whole brought forward in one item, thus :—

3·0
3·6
4·3
3·6
14·3

14·3		
6	7·2	Add risers collected.

These dimensions added would give the area of the treads and risers in the winders, which, as I have before stated, must be kept separate from those of the straight steps which are technically called fliers.

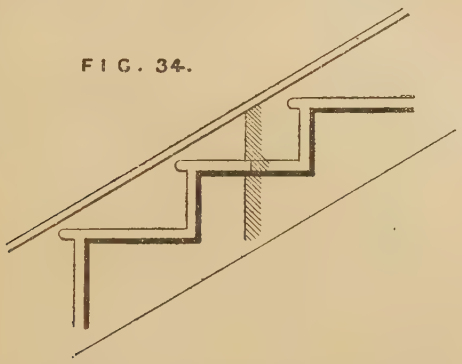
Number the housings to treads and risers, keeping those to winders separate from those to fliers. Brackets are also numbered and described according to the nature of their execution, keeping the circular brackets to winders separate from the straight to fliers. Also, number and describe the curtail end to bottom step as before stated, and also the dovetailed sinkings for balusters, where they occur.

As some of my readers may not understand what is meant by a "housing," I have thought it desirable to give a sketch in explanation (see Fig. 34).

Measure the *strings*, taking the extreme lengths, including all housings, &c., by the width, the latter generally being *assumed*

to be 12 in. State the thickness of the material, and give full description, stating whether plain wall string, rebated and

FIG. 34.



beaded outer string, sunk or moulded ditto, also if mitred to risers, &c. Specify if wreathed, how wreath is formed, whether solid or in thicknesses, &c. All ramps are included in the one dimension for the length of string, but afterwards they are numbered as "*extra* to ramps in the moulded wall string," or as the case may be. Also number all the housings, angles, and ends, stating whether splayed or returned, and the description of the string.

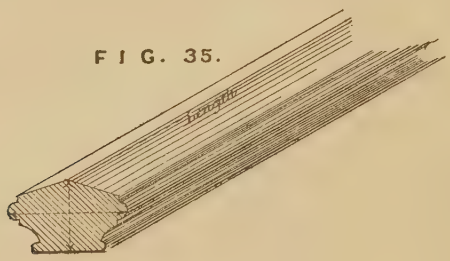
Measure linings to *well-holes* by the foot superficial, describing the thickness of the material and the quality of the labour upon the same.

Take the length of the *handrail* along the centre of the top of the rail, keeping the portions that are ramped, wreathed, and scrolled, each separate from the straight. The level portions, where circular, must be also kept distinct. Describe the nature of the handrail, whether moulded or otherwise, giving sketch if moulded; and also the material, whether solid or vencered, and if French polished; and give the size, being the largest dimension each way (see Fig. 35).

Take the labour to fitting and fixing the iron core at per foot run, describing whether straight or circular; also the sinking for same in a similar manner. Take the mitred and turned caps on

newels at per number; also number the screw-nut and joint to caps, handrail screws, and fixing, &c. Where the openings to

FIG. 35.



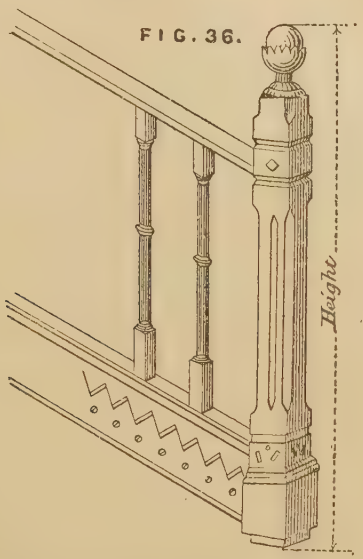
well-holes are small, it is customary to give the width of them, as the diminished width increases the cost of preparing the circular portions of the handrail inclosing the same. The limit of width is generally understood to be about 16 in., all below this being so described.

In measuring newels, take the total length, including the tenon, and give the full scantling of same, measured where the dimensions are the greatest. Fully describe the labour on the same, and the turnings, if any. Iron newels are measured in the same manner as the foregoing, and billed with the Smith, the labour in fixing being, however, billed with the Joiner, and also the labour and material in preparing mould for casting.

Balusters are measured by the foot run, including the tenons. It will be necessary in describing them to state the size, if nailed at both or either end, or if dovetailed. When the balusters are turned to pattern, as sketch for example (Fig. 36), it is best to number them, stating the height and size, and giving a full description of the same, with the mode of fixing as before. Iron balusters can be measured by either of these ways, as they are afterwards reduced to weight as shown in the Smith. Ornamental iron balusters, however, must be taken at per number, and it is customary to fix a p. c. (prime cost) price to them. Where they are not intended to be selected from a pattern-book, but to be executed from special design in cast iron, take labour and material in preparation of mould for the

same. In all cases where of iron, take labour for fixing at per number.

FIG. 36.



Closet Fittings.—Take firstly the seat and riser, measuring the extreme depth of the seat, and adding to this, on Waste, the height of the riser. (See Fig. 37.) This will give one dimension, and the extreme length will form the other, and the item would be described as "inch (deal) seat and riser, and fir bearers," according to thickness. The flap and frame is measured the length by the width, and described, the thickness being stated. Take the skirting round seat at per foot run, stating dimensions and description, and whether moulded or otherwise, numbering the mitred angles and returned ends. Take a running dimension of the nosing on the seat, and state whether moulded or otherwise. Number the hole cut and dished in seat, the hole cut and beaded for handle, also the paper-box, if provided, stating description, and take the ironmongery as it occurs.

Kitchen Dressers, Plate-racks, &c., are generally numbered,

and the full description from specification quoted with the p. c. (prime cost) if stated.

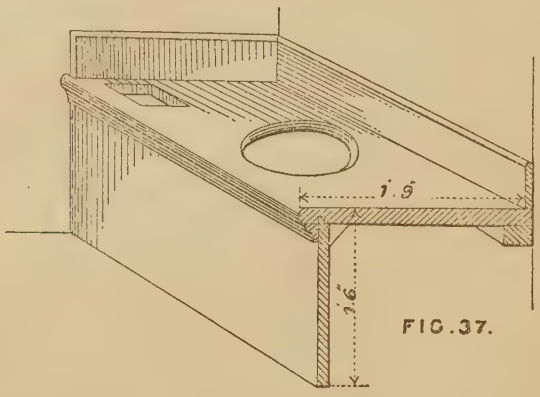


FIG. 37.

Sinks.—These are also numbered, with size stated, and description.

Having concluded the description of the various articles in joiners' work *seriatim*, I should like to preface the Table of admeasurement with a word or two. Firstly, as to the order in which I have arranged the various descriptions of labour and material. Of course, where such a multifarious list of articles appears, as in this trade, differences of arrangement are sure to exist. The course I have adopted is to keep as much as possible the different descriptions of labour with the various articles to which they refer. Thus, commence with the floors, and abstract and bill all labours appertaining to the floors before commencing the skirtings. The same with the skirtings. Then take sashes and frames, doors, linings, shutters, staircases, water-closets, &c. &c., keeping them all separate, as shown in the Table. Many surveyors do not follow this course, but prefer to arrange them all according to their thicknesses, without regard to what they refer to, commencing the list with those of the least thickness, and proceeding in this way to that of the greatest thickness. These different thicknesses are again arranged according to the quality of the work, that of the least value

being placed first. With all due deference to those who follow this course, I think that which I have proposed to be the best, and therefore recommend its adoption.

This Table is not intended to include *every* description of labour in the trade. In a work like the present this would be unadvisable, and indeed impracticable. I have, however, given sufficient examples to enable the reader fully to understand the text of the book, the method of measurement, and the order of taking out, abstracting and billing them. I have also made them as diversified as possible, as will be seen on reference to it. The whole of the various items are presumed in the present case to be in deal, for the sake of making the Table as short as possible. Where the work is in oak or mahogany, it should be kept separate from the deal, and brought into bill after the whole of the deal has been abstracted. Where both oak and mahogany appear, it is customary to give the oak precedence. French polishing, where described in the specification, must also be included in the description in the bill of the joiners' work.

The ironmongery is kept separate from the woodwork, as shown in Table VIII.

Table VIII.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

Inch deal flooring, laid folding	At per square of 100 ft. super.
Ditto yellow batten flooring, laid straight joint	,,
Ditto, ditto, with splayed headings	,,
Ditto, ditto, with ploughed and tongued headings ..	,,
Ditto, ditto, dowelled	,,
Extra to sinking in floor for mat, with straight joint all round	At per foot super.
Scribing inch floors to walls, &c.	At per foot run.
Extra to mitred border to slab in inch flooring	,,
Ditto, ditto, to door-mat ditto	,,
Close joint to old floor	,,
$\frac{3}{4}$ in. × 7 in. deal square skirting, including backings	,,
1 in. × 7 in. ditto torus ditto and ditto	,,
$1\frac{1}{4}$ in. × 9 in. ditto moulded ditto and ditto	,,
$1\frac{1}{2}$ in. × 12 in. ditto, ditto, and sunk ditto and ditto ..	,,

Tongued or mitred angles—*extra to*	At per number.
Housings *ditto*	,,
Ramps *ditto*	,,
Splayed ends *ditto*	,,
Returned ditto *ditto*	,,
Inch deal narrow grounds plugged to walls	At per foot run.
Inch deal wrought and tongued dado	At per foot super.
1½ in. deal plain pilasters, mitred together, glued and blocked	,,
1½ in. diminished columns glued up in narrow widths and closely blocked, 12 in. diameter	,,
1½ in. deal moulded fixed sashes	,,
Ditto hung on centres	,,
Deal cased frames, oak sunk and weathered sills, and 2 in. deal moulded sashes, double hung with brass axle pulleys, patent lines, and iron weights	,,
Extra only to semicircular heads to sashes and frames as above, measured square	,,
Deal cased frames, oak sunk and weathered sills, and 2¼ in. deal moulded sashes, circular on plan, double hung, with brass axle pulleys, patent lines, and iron weights	,,
Extra only to circular heads and sashes and frames, as last, measured square	,,
Deal cased frames, oak sunk and weathered sills, and 2 in. deal ovolo sashes to Venetian windows, double hung with brass axle pulleys, patent sash-lines, and iron weights, the side lights to be fixed lights ..	,,
1½ in. deal bead butt and square lifting shutters ..	,,
Ditto bead flush and square back flaps	,,
Ditto deal moulded shutters, bead butt at back, hung in three heights	,,
Ditto proper boxing grounds on splay	,,
Deal wrought and moulded rim screwed to door ..	At per foot run.
Fir in proper door cases	At per foot cube.
Inch deal proper ledged door	At per foot super.
1½ in. ditto framed, ledged, and braced doors, filled-in with inch matched and beaded battens	,,
2 in. ditto framed and braced door, filled-in with V-jointed battens, grooved and tongued, to have quadrant and square corners	,,
Ditto, ditto, four-panel and square door	,,
Ditto, ditto, panels moulded one side	,,
Ditto, ditto, moulded both sides	,,
Ditto, ditto, two-panel bead butt and square door ..	,,
Ditto, ditto, three-panel, bead flush both sides doors, with diminished upper stiles, upper panel open for glass	,,
2 in. deal three-panel bolection moulded and bead flush door, the upper panel open for glass, with moulded movable stops	,,
Ditto, ditto, ovolo sash door, the two lower panels to be moulded both sides	,,

Ditto, ditto, rebated folding doors, in four panels each fold, panels moulded both sides	At per foot super.
2¼ in. ditto framed and braced doors, filled in with 1 in. battens, matched and V-jointed, and the framing stop-chamfered	,,
Ditto, ditto, folding doors hung with swing hinges, lower panels bolection moulded and raised on one side, and flat moulded and raised the other, upper panels open for glass, with large bolection moulding one side and brass screws the other	,,
Inch deal wrought and framed grounds	,,
Ditto, ditto, to segmental heads	,,
Inch deal wrought one side and beaded linings, including backings	,,
Ditto, ditto, tongued to frames and ditto	,,
Ditto, ditto, splayed linings and ditto ditto	,,
Ditto, ditto, and double-beaded and cross-tongued linings and backings to opening	,,
Ditto, ditto, tongued and staff-beaded lining to segmental heads..	,,
Ditto, ditto, tongued and rounded window boards and bearers	,,
Ditto, ditto, two-panel moulded window backs and backings	,,
Ditto, ditto, moulded elbows and ditto	,,
Ditto, ditto, on splay	,,
Ditto, moulded soffit with splayed ends	,,
Labour to groove	At per foot run.
Ditto, to cross groove	,,
Ditto, to groove in oak	,,
Ditto, to splayed cutting to inch linings	,,
Notched, returned, and rounded ends to window boards	At per number.

Deal in Thickness.

¾ in. one side matched and beaded batten boarding, plugged to walls..	At per foot super.
Ditto, ditto, boarding in 4½ in. widths to ditto.. ..	,,
Ditto, ditto, fixed on and including 1 in. battens to ditto	,,
⅞ in. one side and staff-beaded casings	,,
Ditto, both sides matched, beaded, and ledged batten boarding	,,
Inch one side and V-jointed boarding, fixed diagonally	,,
Ditto, ditto, ploughed and tongued shelves and bearers	,,
1¼ in. both sides framed and beaded cupboard front ..	,,
Extra only labour to door in ditto	,,
1½ in. both sides and cross-tongued batten boarding to spandrel	,,
1½ in. deal wrought, both sides ploughed, tongued, and dovetailed cistern	,,
Ditto, proper ledged folding flaps to ditto	,,

2 in. deal framing, panels moulded on both sides, properly secured to floor and ceiling	At per foot super.
Extra to circular corner in ditto	At per foot run.
Labour to rounded edge	,,
Ditto bead	,,
Ditto rebate	,,
Ditto rebated and mitred angle to lining	,,
Wrought fillet	,,
Deal beaded capping	,,
1½ ,, plancere	,,
Deal moulding 3 in. girth	,,
Ditto, architrave ditto, 4 in.	,,
Ditto, ditto, 5 in.	,,
Ditto, (circular) ditto 5 in.	,,
Mitres to 5 in. moulding	At per number.
Deal moulded cornice, 6 in. girth	At per foot run.

Staircases.

¾ in. deal wrought risers	At per foot super.
Ditto, ditto, and beaded fascia	,,
Inch ditto, ditto, wrought treads and risers, glued, blocked, and bracketed, with rounded nosings and strong fir carriages	,,
1¼ in. ditto, ditto, with moulded nosings and ditto ..	,,
Ditto, ditto, in winders	,,
Ditto, plain wall string	,,
1½ in. ditto moulded ditto	,,
Ditto, ditto, cut and mitred outer string	,,
2 in. deal moulded nosing	At per foot run.
3 in deal wrought and square framed newel	,,
3½ × 3 in. deal moulded handrail	,,
1 in. deal square bar balusters	,,
Housing treads and risers to close string	At per number.
Ditto, ditto, winders ditto	,,
Ditto, treads and risers to cut and mitred outer string	,,
Ditto, ditto, winders ditto	,,
Ditto, treads and risers to newel	,,
Ditto, strings to ditto	,,
Ditto, handrail to ditto	,,
Ditto, for balusters	,,
Tongued and mitred angle to wall string	,,
Extra to ramp in moulded wall string	,,
Ditto, ditto, in cut and mitred outer string	,,
Cut and mitred brackets to steps	,,
Returned and mitred moulded nosings to fliers	,,
Ditto, ditto, winders	,,
Extra to rounded end to step and riser	,,
Extra to curtail end to step	,,
Ditto splayed ends to deal handrail	,,
Ditto end of handrail cut and pinned	,,
Ditto mitred cap ditto	,,

Turnings to newel	At per number.
Cut pendants	,,
Cut and chamfered caps	,,
Ornamental newels (with description)	,,
Ditto, balusters (ditto)	,,
Extra to ramp in handrail	,,
Ditto wreath ditto	,,
Ditto scroll end ditto	,,
Screw nut and joint	,,

Water-closets.

Inch deal seat and riser made moveable, with proper bearers	At per foot super.
Ditto beaded frame and mitre clamped flap	,,
Skirting round seat	At per foot run.
Mitred angles to skirting	At per number.
Returned ends do.	,,
Holes cut and dished for seat	,,
Ditto cut and beaded	,,
Deal paper-box (with description)	,,

Kitchen and Scullery.

Deal dresser (with full description)	At per number.
Ditto plate-rack ditto	,,

Ironmongery.

Including screws and fixing	At per number.
Pairs butts (according to size, stating the smallest sizes first, and keeping the cast and wrought iron separate, also the brass)	,,
Ditto rising butts (ditto)	,,
Ditto back flaps (ditto)	,,
H or HL hinges, ditto	,,
Cross garnet hinges	,,
Patent swing hinges for 2 in. doors, and letting in floor	,,
Pairs steel centres on plates	,,
Necked bolts (stating size)	,,
Barrel ditto, with brass throw (ditto)	,,
Brass flush ditto (ditto)	,,
Gothic cast-iron door-knob	,,
Ditto knocker	,,
Iron barrel door-chain	,,
Norfolk latches	,,
Brass-cased pulpit latches	,,
Mortise latches	,,
Cupboard locks	,,
Dead locks (stating size)	,,

Iron rim-locks and brass furniture (stating size) ..	At per number.
Mortise locks and ditto	,,
Rebated ditto, ditto	,,
Two-bolt mortise lock and ditto, ditto	,,
—— patent lock, p. c., 21*s.*	,,
Sets white china furniture	,,
Ditto black and gold ditto, ditto	,,
Pairs, porcelain finger plates	,,
Brass spring sash fastenings	,,
—— patent ditto ditto	,,
Brass knob turn-buckles	,,
Ditto thumbscrews	,,
Iron stubs and plates	,,
Ditto shutter lifts	,,
Brass ditto latches	,,
Brass quadrant regulator fastenings, with pulleys, lines, and hooks, complete to fanlights	,,
Leather straps and brass buckles and plates to spring doors	,,
Iron tongue and groove	At per foot run.
Wrought-iron balusters	At per number.
Ditto newel (twisted or otherwise)	,,

CHAPTER VIII.

SMITH AND FOUNDER, GASFITTER AND BELLHANGER.

CUSTOMARY COMMENCEMENT — HOW BILLED, HOW MEASURED — WROUGHT IRON—CHIMNEY BARS—FLITCHES—RIVETED GIRDER —EXAMPLE OF T AND CROSS IRON—CIRCULAR COLUMNS— HOLLOW COLUMNS—BOLTS—STRAPS—CAST IRON—ORNAMENTAL WORK—GUTTERS, &C.—ABSTRACTING—PROVISION FOR—TABLE OF WORK—GASFITTER—PIPING—GASELIERS—SUN-BURNERS— FEES TO COMPANY—CUTTING AWAY FOR—TABLE OF WORK— BELLHANGER—TUBES—PULLS, &C.—TABLE OF WORK—ELECTRIC BELLS.

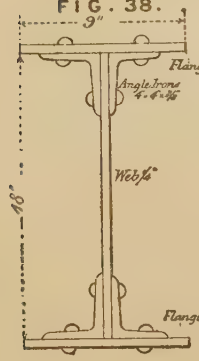
IT is customary in measuring the smith and founders' work to commence with the articles executed in wrought iron, which, owing to the difference in price and workmanship, must be kept separate from those executed in cast iron. Many of the items are taken off with the other trades to which they have reference so as to prevent them being omitted; and with respect to these, it will be necessary to bring them into the abstract, in order that the whole of the trade may be billed from the one abstract.

Ironwork generally is billed at per weight. The exceptions to this rule will be found in the Table. Ironwork is measured from the drawings in feet and inches, and abstracted according to its thickness, the transfer to weight being carried out on the abstract. The means of effecting this are various. I will give one example hereafter, but will firstly speak of the measurement.

Wrought iron.—Wrought iron in chimney and bearing bars is measured by the foot superficial, taking the extreme length, including turnings up and down, by the width, and stating the thickness. These are taken off with the bricklayer. Flitches, which are measured with the carpenters' work, are also measured by the foot superficial. Make no deductions for the holes for

bolts, because, if drilled, there would be no deduction, and if punched, the deduction would only be worth the weight of old iron. Number the holes in flitch for the bolts, stating the thickness of the metal. I give an example, showing the method of measuring a riveted girder 20 ft. long, as per Fig. 38.

FIG. 38.



20·0			
1·6		¼ in. web.	
20·0			
9		½ in. bottom flange.	
20·0			
9		¾ in. top do.	
4 20·0			
8		⅜ in. angle-irons.	
			4
			4
			8
6)	60	2½ in. by ¾ in. rivets.	20
			3
			60

If preferred, the top and bottom flange may be taken in one item, thus:—

20·0		
9		1¼ in. top and bottom flanges,

adding the thickness of metal together. The rivets, as will be observed, are taken as 4 in. from centre to centre. The holes should *not* be numbered in this description of girder, as they are included in the item. The weight of the above girder is 12 cwt. 1 qr. 25 lb., and I leave it to the ingenuity of my readers to work it out for themselves. The weight of iron per foot is given at the end of this trade. I have, as will be observed, taken the extreme dimensions of the angle irons each way for the width, this being the customary way of measuring amongst engineers. Tee and cross irons are measured in the same way, taking the outside dimensions in each case, as shown in Figs. 39

and 40. By adopting this course, a small additional amount of iron is taken, which provides against any little discrepancies which

FIG. 39.

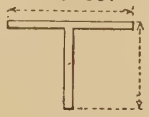
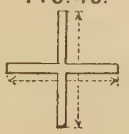


FIG. 40.



may arise in its measurement, it being almost impossible to find the exact weight of any girder by simply measuring it from the drawings in the ordinary way. Such, at least, is my experience.

In measuring circular columns where solid, it will only be necessary to take the length by the average diameter, making an addition for the cap, base, and caulking. Hollow columns are taken by the foot superficial—the length by the average mean circumference—adding for cap, base, and caulking as before. In the case of solid columns the dimensions would be reduced to the foot cube, and the weight would be easily found.

Bolts are measured by the foot run, stating diameter, the head-nut and washer being taken separately at per foot superficial, and the whole reduced to weight, as shown in the Table. Where the bolts, however, are under one foot in length, it is customary to number them according to their respective lengths and diameters. Straps are taken at per foot superficial, as are also railings, grating bars, and other work of a similar description, and afterwards reduced to weight.

Cast iron is measured in the same manner as wrought iron, and my remarks thereon will therefore apply to this. State at the head of the bill for the cast iron, that the cost for patterns for casting from, is to be included in the several items, or take and enumerate the patterns separately, in which case they should be billed with the Carpenter. This course is, however, seldom taken, the items including both patterns and fixing. The Table shows the method of measurement, and it is therefore unnecessary for me to repeat here. A little difficulty may present itself at first in calculating for the weight of ornamental work, but by experience this is soon got over. It is customary to measure it

pretty fully, it being much better to take a little more than a little less.

In measuring the various items as gutters, rain-water pipes, cresting, gates, coal-plates, &c., &c., it will be necessary to give the sizes and description.

In conclusion, I would state that in abstracting, take the several items under the several thicknesses, when they may be reduced to the uniform thickness of an inch, or as preferred.

Wrought iron weighs 40 lb. to the foot superficial of 1 in. in thickness, and cast iron 37½ lb. From these two items the student will be able to arrive at all his calculations. By multiplying by twelve we obtain the weight per foot cube; and by multiplying by ·7854 and dividing by 12 we obtain the weight per foot run of round iron, 1 in. in diameter. Some surveyors trust to table-books, but it is much more practical for the student to work it out for himself.

I may observe that it is a common practice amongst some of the profession, in treating of small buildings, to make a "provision" for many of the items, instead of measuring them, that is, to provide for a certain weight, and whatever is used under or over this amount must form a deduction, or addition, to the estimate, as the case may be; and after considerable experience it is possible to fix the weight in such cases pretty closely, although it is a course which I do not recommend.

TABLE IX.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

WROUGHT IRON (*including Fixing*).

In riveted girders	At per cwt.
„ rolled iron ditto	„
„ chimney and bearing bars	„
„ furnace ditto	„
„ straps and ties	„
„ bolts and ties, with screwed ends, with nuts and washers	„
„ half-round handrails and square or round balusters	„
„ plain window-guards	„
„ framed area gratings	„
„ bolts under 12 in. long, and other small items ..	At per number.
Riveted tanks	At per gallon.
Coppers	„

CAST IRON (*including Patterns and Fixing*).

In plain girders	At per weight.
„ open ditto	„
„ solid columns	„
„ hollow ditto	„
„ heads and shoes to principals	„
Eaves gutter	At per foot run.
Angles	At per number.
Stopped ends	„
Outlets	„
Rain-water pipes	At per foot run.
Heads	At per number.
Shoes	„
Ears	„
Iron cresting	At per foot run.
Finials	At per number.
Shutter bars	„
Air bricks	„
Gratings	„
Brackets	„
Stoves (according to descriptio)	At per in. lineal.
Ranges (ditto)	„
Copper doors and frames	At per number.

GASFITTER.

Gasfitters' work is measured as shown in the accompanying Table. It will be necessary for the surveyor to specify the sizes and quality of the pipe as shown therein, and to number the various fittings to the same as elbows, &c., as *extra to*, beyond the price of the tubing, the lengths of the same being included in that of the pipe. Short pieces of pipe, that is, when under 2 feet in length, are numbered in the same way, also as extra. Of course, it will be unnecessary for me to give the different descriptions of the several articles used in gas-fitting, my object being simply to show how they are measured. The descriptions and prime cost values of special items, as gaseliers, sun-burners, &c., should be inserted in the specification by the architect.

Make an item for paying the fees to the gas company for opening the ground and tapping the main; and any excavation beyond this, where intended to be executed by the builder should be measured by the foot run, and the depth stated. An

item is also made for cutting away for, attending upon, and making good after this trade.

TABLE X.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

Welded gas-tubing (according to size, stating the diameter of the bore of the pipe)	At per foot run.
Bends, elbows, tees, crosses, sockets, outlets, extra to outlets, stating diameter of bore in each case ..	At per number.
NOTE.—Each of these items must be specified separately in the "Bill."	
Stop-cocks and brass spanners, stating size and description	At per number.
Gas meters, stating number of lights it is to supply, and description	,,
Gas pillars, brackets, pendants, &c., according to description	,,
Star-burners, and sun-burners, according to description	,,
Pay gas company's fee for opening ground and tapping main	,,
Allow for cutting away for, attending upon, and making good after gasfitter in all trades	,,

BELLHANGER.

The description of the bellhanging is generally taken directly from the specification, stating the number and description of the bells, and the various parts of the house from whence they are rung, and their positions; also stating whether the wire is intended to be concealed in secret tubes; if so, whether zinc or copper; and the description and quality of the pulls. This item would include all cranks, wire, &c.; but a separate item must be taken for the attendance of the other trades in cutting away, &c., and making good. Such is the customary mode of dealing with the bellhanger, the cost of wire being so slight, that a few feet more or less make no perceptible difference in the estimate, and surveyors, as a rule, do not think it necessary to measure it. A general description of the bells should preface the bill, as shown in the accompanying Table:—

TABLE XI.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

The whole of the bells are to be hung in concealed zinc tubes, with best cranks and wire, in the best manner, and all to have pendulums and labels.

Crank pulls on third floor, to ring to bell on ground floor	At per number.
Lever pulls with white and gold china furniture on first floor, to ring to bell on ground floor	„
Call-bells and brass slides on ground floor, to ring on third floor	„
Bronzed sunk and dished pulls, 6 in. diameter, and fixing at entrance, engraved "Visitors," to ring one bell on ground floor	„
Bronze draw-out pull, and fixing at entrance	„
Allow for cutting away, for attending upon, and making good after, bellhanger	„

Where the surveyor prefers to take the several items separately, the following is the method of measurement:

Copper wire	At per yard run.
Tubing (zinc or copper)	At per foot run.
Cranks (with description)	At per number.
Pulls „	„
Bells „	„
Attendance, &c., as before	„

Electric bells are generally charged for at per pull, and the indicating bell numbered. Indicator boxes at per indicator, according to description; and batteries are taken at per cell, stating the description of the battery.

CHAPTER IX.

PLASTERER.

COMMENCEMENT — EXTERNAL WORK — DEDUCTIONS FROM — ADDITIONS TO—LABOUR—REVEALS—CORNICES, ARCHITRAVES, &c.—ENRICHMENTS—BEADS AND QUIRKS—COLUMNS, PILASTERS, &c. — FLUTING — STRINGS, &c. — BALUSTERS — CHIMNEY-POTS — RENDERING—INSIDE WORK—CEILINGS—EXAMPLE OF—DEDUCTIONS—ADDITIONS—LATH AND PLASTER—WHITENING—EXTRA TO—PANELS —CENTRE FLOWERS—SOFFITS—CORNICES—EXAMPLE OF—ENRICHMENT TO—FRIEZES—RENDERING TO WALLS—ANGLES —BEADS AND QUIRKS—CIRCULAR LATHING AND PLASTERING TO PARTITIONS — MOULDINGS AND ARCHITRAVES — CEMENT SKIRTINGS—CEMENT FLOORS—CEMENT HEARTHS—LIMEWHITING, COLOURING, DISTEMPERING, &c.—TABLE OF WORK.

IN the admeasurement of plasterers' work, it is advisable to adopt the course already prescribed, namely, to take floor by floor, completing one floor before the other is commenced. In this case, however, the rule is applicable only to inside work; that to outside being taken on the entire surface. Read carefully the specification, and keep the different descriptions of cement separate. Commence then with the *external work*.

EXTERIOR:—Measure the entire portion covered, taking the length by the height, including all projections for set-offs, plinths, strings, &c., and also the returns, so as to arrive at the entire area. Make all the deductions as they occur for openings, &c. Describe the nature of the workmanship and quality of the material. State whether laid on brick or on laths, and whether jointed to imitate stone. It is recommended that all additions be taken before any deductions appear in the Dimension-book or paper, as by adding and subtracting these items the total area can be brought into abstract in one item, thus effecting a saving of time, and producing less complication. The total is afterwards reduced to the yard superficial, and

billed accordingly, as shown hereafter in the Table. Having disposed of the superficial area, take a running dimension of the arrises or angles, additional labour being necessary to obtain a clean, sharp angle, and abstract and bill it accordingly. Labour to beads and quirks is also measured by the foot run. Take all reveals and soffits, and other work, where executed in narrow widths, by the foot superficial.

Cornices, Architraves, &c., are measured by the foot superficial, taking the length by the girth; number all mitres, stopped ends, and returns, stating in each case the girth of the mouldings to which they relate, all cornices under 6 in. girth are measured by the foot run. Take the enrichments by the foot run, stating the girth, and giving sketch in explanation, also numbering the mitres and stops to the same. All mouldings, architraves, &c., above 6 in. girth are measured by the foot superficial, taking the extreme length by the girth, as shown in Fig. 21, p. 55, *ante;* where under that girth, by the foot run; number all mitres, stops, and returns, stating in each case the girth as before. Take all beads and quirks by the foot run, and number the mitres and stops.

Columns, Pilasters, &c.—Plain work, &c., to columns, is measured by the yard superficial, and described as circular work to columns, the mouldings to necking and base being measured as already stated, but described as circular. Number the caps, and give a sketch showing what is intended, and also figure on it the height of the cap, and the upper and lower diameters. Pilasters are measured by the foot superficial. Take a running dimension of the arris, and also of the neck and base mouldings when under 6 in. girth; number the mitres. Number the cap, and give sketch and figure dimensions. Take any fluting to pilasters and columns by the foot run, stating whether diminished, and number the semicircular stoppings to ditto.

Strings, &c.—Floriated moulded strings and parapets, &c., &c., are measured by the foot run, giving sketches and dimensions for the different descriptions of work.

Balusters are numbered, giving sketch and dimensions.

Chimney-pots are numbered, stating dimensions, and, when out of the ordinary, giving sketch.

Rendering to inside of parapets, &c., is measured by the yard superficial, as shown in the Table.

Inside Work.—In measuring inside work, adopt the same course throughout each room; commence at the bottom of the house, and take floor by floor as already stated. Proceed to measure the ceilings firstly, then take the cornices, and then the walls; and lastly, whatever else remains, as skirtings, &c. Measure the ceilings the full dimensions between the walls; but where cornices occur, it is customary to make a deduction of the width of the cornice upon each dimension for width and length of ceiling. This is done on "Waste." Presuming the room to be 20 ft. long and 16 ft. wide between the walls, and a cornice run round the room, projecting from the face of the wall 12 in., this would appear in the Dimension-book as follows:—

Length	20·0
Less cornice	1·0
Net length	19·0
Width	16·0
Less cornice	1·0
Net width	15·0

19·0			
15·0		285·0	Lath, plaster, float, and set ceiling.

Make the deductions for chimney breasts, &c., and also any additions that may occur. Refer to specification for description of the work, and state the same fully in the quantities, whether lath and plaster one coat; ditto one coat and set; lath, plaster, float, and set; or as the case may be. Some surveyors take the sizing and whitening to ceiling, and include it in the one dimension, thus:—

19·0			
15·0		285·0	Lath, plaster, float, set, and twice whiten ceiling.

This, of course, is quite optional; but undoubtedly it effects a little saving of time, though the dimension for whitening ceilings would simply be a repetition of that for plastering.

Where elaborate ceilings occur, it is customary to measure

such elaborations as "extra" to the ordinary work, and to take the same by the foot superficial, as, for example, to raised panels.

Panels.—Take mouldings to panels by the foot run, stating the girth; number the labour to mitres, stoppings, &c. Also number pateras and centre flowers; and in the latter cases it is recommended that architects should always affix a p. c. value in the specification, as it is almost impossible to give sketch; and in very few cases are details sufficiently far advanced to include the centre flowers; and as also in many cases they are selected, this will be the more apparent.

Soffits to stairs are measured in the same manner as already described to ceilings, although they must be kept separate from the ceilings, as hereafter shown.

Cornices are measured the length by the girth, and where the latter exceeds 6 in. they are taken superficially; under that girth they are, however, measured and billed at per foot run. To obtain the average length of cornice take the full dimension between walls for the lengths of two sides, and the net length between the nose of the cornices for the other. These should be collected on "Waste," thus taking the case already given (cornice 1 ft. projection, 18 in. girth), we have:

Length of room between walls ..	20·0
Ditto	20·0
Net length between cornice ..	15·0
Ditto	15·0
	70·0

70·0		
1·6	105·0	Plaster moulded cornice.

Or the length may be arrived at by taking the round of the walls and deducting twice the projection of the cornice, thus:—

	20·0
	20·0
	16·0
	16·0
Round of walls	72·0
Twice projection of cornice	2·0
	70·0

Make the additions and deductions as they occur. Number all the mitres, and state the girth, and keep the external and internal angles separate. Also number the stopped or returned ends, stating girth as before. Enrichments to cornices are measured by the foot run, stating girth, and also whether undercut. The mitred angles and stopped ends to enrichments to be taken and numbered as described to cornice.

Friezes are measured the length by the width, and valued by the foot superficial, any enrichments being taken, as already described to cornices.

Rendering to walls is measured the length by the height, the latter being taken from the top of the skirting grounds to the ceiling, and where there is a cornice it is customary to deduct from this dimension half the height of the cornice. The lengths of the several walls of each department can be collected on "Waste," and brought forward in one dimension if preferred. Make the additions and deductions where they occur. In the case of deductions for doors and windows, take the full dimensions for length and height to the outside of the grounds, and not the net dimensions. In the case of doors, the height, where there is a skirting, must be taken from the top of skirting grounds, and not from the floor. State the nature of the wall and the number of coats, whether floated and set, &c., &c. Where the angles are described to be executed in Keene's or other patent cement, measure the same by the foot run, taking the length as already stated to walls, and describing as "*extra* to Keene's cement angle," or as the case may be.

Beads and quirks are measured in a similar manner.

If any of the foregoing work is executed on a circular surface, it must be so stated, and be kept separate from the straight work.

Lathing and plastering to partitions follows rendering to walls, and is measured in a similar manner, with the exception that where cornices occur it is customary to deduct only one-third the depth of cornice from the height, instead of one-half as described to walls. Make the additions and also the deductions as stated to walls, and keep any circular work separate from the straight. Describe the nature of the work, whether

lath and plaster one coat; lath and plaster two coats; lath, plaster, float, and set, &c., &c. Where the work is executed in narrow widths, as to jambs, soffits, &c., it should be measured by the foot superficial and kept separate. This applies also to rendering to walls.

Measure all mouldings and architraves as already described to external work.

Cement Skirtings.—Take the lengths and collect the same on Waste. State the height, and they are afterwards reduced and valued by the foot superficial. Where the skirtings are moulded, instead of the net height take the girth from floor to face of plastering of wall. Number all the angles and state the nature of the work.

Cement Floors are measured by the yard superficial, and the nature of the work described, also the quality of the material.

Cement hearths are measured by the foot superficial.

Limewhiting, Colouring, Whitening, Distempering, &c., are measured by the yard superficial. Take the dimensions of the several walls, collecting the lengths on "Waste" of all walls of equal height, so as to bring forward in one dimension. Make the additions where they occur, and also all deductions for door and window openings, fire-places, &c. Take the cornices by the foot run, and state the girth, and where enriched, state the number of members and tints. It may be observed that most of the dimensions for this work can be taken from the dimensions for plastering.

Table XII.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

Externally.

Portland Cement.	
Plain face on brick	Per yard super.
Ditto, jointed	„
Ditto, circular	„
Ditto, to fascias, pilasters, reveals, &c.	Per foot super.
Ditto, in weathering	„
Plain mouldings	„
Ditto, circular	„

Arris	Per foot run.
Bead and quirk	,,
Flutes to columns	,,
Ditto, diminished	,,
Mouldings under 6 in. girth	,,
Stops to mouldings	At per number.
Returns to 6 in. ditto	,,
Mitres to 9 in. ditto	,,
Intersecting mitres to ditto, ditto	,,
Enriched and floriated strings, cornices, &c., &c. (stating height and giving sketch showing nature of work)	At per foot run.
Stopped ends to ditto	At per number.
Angles	,,
Ornamental parapets, including all dubbing out, &c. (giving dimensions and sketches as before)	At per foot run.
Moulded trusses, ditto, ditto	At per number.
Caps to pilasters, including mitres and returns, ditto, ditto	,,
Ditto to columns (giving sketch and height and upper and lower diameters)	,,
Rough rendering to back of parapets, &c.	At per yard super.

Internal Work.

Render, one coat	At per yard super.
Ditto, two coats and set	,,
Ditto, float and set	,,
Ditto, to jambs, and in narrow widths	At per foot super.
Ditto, circular	,,
Lathing	At per yard super.
Lath and plaster, one coat	,,
Ditto, ditto, one coat and set	,,
Ditto, ditto, two coats and set	,,
Ditto, ditto, float and set	,,
Ditto, ditto, to groins	,,
Lath, plaster, float, set, and twice whiten ceilings	,,
Ditto, ditto, soffits of stairs	,,
Plain mouldings	At per foot super.
Mitres to 8 in. moulding	At per number.
Stoppings	,,
Enrichments (stating girth and giving sketch)	At per foot run.
Mitres to 6 in. enrichment	At per number.
Stops to ditto	,,
Keene's cement angle	At per foot run.
Bead and quirk	,,
Ditto and double quirk	,,
Ditto, ditto, circular	,,
Mitres	At per number.
Stops	,,
Stops to splay	,,
Ditto, moulding	,,

Pateras 6 in. diameter, p. c. 2*s.*	At per number.
Centre flowers, 30 in. diameter, p. c. 30*s.*	,,
Portland Cement flooring (stating thickness)	At per yard super.
Ditto, hearths (ditto)	At per foot run.
Twice limewhiting	At per yard super.
Ditto, colouring	,,
Washing, stopping, and whitening	,,
Ditto, distempering to approved tint	,,
Ditto, ditto, cornices	At per foot super.
Ditto, ditto, enrichments, picked out 4 in. girth in tints	At per foot run.

CHAPTER X.

PLUMBER.

EASY TO MEASURE—DIFFICULT TO PRICE—MILLED OR SHEET LEAD—WHERE TO COMMENCE—ABSTRACTING—FLATS—EXAMPLE OF—DRIPS—ENDS TO ROLLS—FLASHINGS TO—GUTTERS—CESSPOOLS—COVERINGS TO DORMERS, CHEEKS, APRONS, &c.—FLASHINGS—POINTING TO—ABSTRACTING—FINIALS—CISTERNS—SINKS—NAILING—PIPES—BRASS WORK TO—W. C. APPARATUS—SOIL PIPES—SERVICE BOXES—PUMPS—LAVATORIES AND URINALS—TABLE OF WORK—ZINC-WORKER—DIFFERENCE FROM LEADWORK—GUTTERS—RAIN-WATER PIPES—HEADS, &c.—TALLBOYS—VENTILATORS—SKYLIGHTS—METAL LIGHTS—SPEAKING PIPES—TABLE OF WORK.

THE admeasurement of plumbers' work, whilst perhaps more simple than that of the trades of which I have already treated, requires a greater degree of care in taking the dimensions, as, owing to the expensive nature of the material and labour, an error which might appear at first sight to be small, frequently turns out to be extensive. In all cases take the exact dimensions of the several items, making no allowances whatever.

It may be as well to observe here that, whilst comparatively easy to the quantity surveyor to take off the quantities and measure up the work appertaining to plumbing, it is more difficult for a builder to estimate the same, owing to the peculiar circumstances under which the work may be executed varying in almost every job; the labour in fixing pipes depending upon the situation of the several cisterns, sinks, &c., and the construction of the different parts of the building—in some cases entailing considerably more cutting away and making good than in others—and as in some cases the builders do not

even know in what portion of the building some of the connections are to be made, the force of this remark becomes the more apparent.

Milled or Sheet Lead.—Sheet lead is measured by the foot super, and reduced afterwards to weight; the specification stating the quality of the material—as 5 lb., 6 lb., or 7 lb. to the foot superficial—and, of course, by multiplying the superficial area of the lead by the number of lb. to the foot, we arrive at the total weight.

In "measuring up" it is generally advisable to gauge the lead to ascertain the weight, when the builder is not to be depended upon, and the architect is uncertain as to whether the quality specified has been laid, though this course is seldom pursued.

Preparatory to its being laid, however, the architect should invariably have a sample (one foot super) cut off, and thus ascertain whether it contains the weight stated in the specification.

Commence by measuring the leadwork to roof, taking, firstly, any flats, then the gutters, and lastly, the flashings.

In abstracting, head a separate column for each of the different qualities of lead.

In flats take the extreme dimensions each way; but when out of the square take the average, so as to obtain the net area. Include all turnings up, drips, and rolls; in the latter case the

FIG. 41.

amount to add to the width would be, in a properly constructed roll, as shown in Fig. 41, twice the circumference of the roll, less the net width of the same. This would give about 9 inches wide, and supposing the net size of the flat to be 12 feet × 10½ feet, and there are five rolls running the lengthways of the flat,

which is turned up each way 6 inches, the items would appear in the Dimension-book as follows :—

	′ ″
Length	12·0
Turns up 2/6 in. ..	1·0
	13·0
Width	10·0
Rolls 5 in.	3·9
Turns up 2/6 in. ..	1·0
	14·9

′ ″	′ ″	
13·0	191·9	6 lb. milled lead in flat.
14·9		

Where drips occur, add the width of the same to the length or breadth, as the case may be, on "Waste," so as to bring the whole flat forward in one dimension.

Number the bossed and soldered ends to rolls, and the extra labour in forming any cesspools in flats, in which case it will also be necessary to take outlet or socket pipes for communication of rain water from flat to downpipe. These are also numbered, stating size and length.

Collect the round of the walls for the flashing, on "Waste," adding for the laps at the angles, for the length; state the width, and the quality of the material, which is generally of less weight per foot than that to the flat. Then reduce the item to the foot superficial.

In measuring gutters, take the entire length, adding for laps and turns up, and the sum of these by the average width will give the area. It is always advisable to show how the whole of the dimensions are arrived at on "Waste." Number cesspools and outlet pipes as before.

Coverings to dormers, cheeks, aprons, &c., are all measured by the foot superficial, including all laps, &c. Hips and ridges are also measured in this way.

Flashings, where stepped, must be kept separate from the foregoing in the bill, and when against stone it is necessary to

take a separate item for "burning in flashing," which would be simply a running dimension, stating the length.

Pointing to flashing is measured with the bricklayer, as stated therein.

After abstracting the sheet lead, it is brought into bill by multiplying the area by the weight of the lead per foot; thus, supposing the area of 6 lb. lead to be 150 feet, this would equal 900 lb. or 8 cwt. 0 qrs. 4 lb., to which should be added the weight of the 5 lb. and 7 lb. lead, if any, ascertained in a similar way, and the whole brought into bill in one item.

Leadwork in dressing to finials is measured in with the foregoing, and where extra labour is required, it is expressed as "extra labour and solder in dressing lead round moulded base of finial 12 inches × 12 inches, and 16 inches high, as sketch," or as case may be, giving sketch where necessary.

Leadwork to cisterns and sinks is kept separate from the foregoing in the bill, as shown in the Table, but measured in a similar manner, taking care to add all laps, &c. Take a running dimension of soldering to angles, and also of nailing, stating, whether lead-headed or copper nailing, and whether laid closely or otherwise. Number the standing waste, and state whether trumpet mouthed; also number washer and waste, and all other brasswork hereafter described.

Pipes and Brasswork.—Lead pipes are measured by the foot run, and would be easier billed in this way, though many surveyors prefer to bill them as they are sold, viz. by weight. State the sizes and quality where taken at per foot run; also mention whether including all joints, &c., &c., although it is better to number the same as extra, which, by the by, is seldom done. Number all cocks, stating sizes and giving full description, whether rivet or screw bottom, and if with screw bosses, &c., &c. Be particular to state whether stop, bib, or ball cocks, and if the latter, do not omit the balls, stating whether copper or zinc.

Also number all washers, plugs, unions, traps, gratings, giving size and full description in each case.

W. C. Apparatus.—The w. c. apparatus is generally numbered complete, giving full description of the quality of the different

parts, if with white or blue basin, patent valves, brass, flat, or sunk plate, &c., &c., and if patent closets, give name of patentee, and p. c. value of the same. Number the D traps, and take any soil pipes by the foot run, stating the diameter and the weight of the lead it is made of per foot superficial. Number the joints, and take extra labour in forming any elbows or bends. Also number all service boxes.

Pumps.—Pumps are numbered, stating description and p. c. value, exclusive of fixing, the builder adding cost of carriage, profit, and fixing complete.

Lavatories, &c.—Lavatories and urinals are also numbered and described, the brasswork and pipes being taken separately as previously described.

Table XIII.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

Milled lead, and labour in gutters, flat, flashings, &c., including all solder, wall hooks, &c., complete ..	At per cwt.
Ditto in step flashings	,,
Ditto in linings to cisterns, sinks, &c.	,,
Close copper nailing	At per foot run.
Zinc nailing	,,
¾ in. strong drawn lead pipe (— lbs. per foot and fixing)	,,
Joints to ¾ in. pipe	At per number.
(Here follow other diameters of pipes, stating smallest first, and giving weight per foot run in each case.)	
4 in. lead soil pipe out of 7 lb. lead and fixing	At per foot run.
Joints to ditto	At per number.
Elbows to ditto (extra only)	,,
Trumpet-mouthed standing waste, 2 ft. 6 in. long ..	,,
Brass washer and waste (stating size)	,,
Ditto, with fly nuts for slate cisterns (ditto)	,,
Lead bell-traps with brass grates (ditto)	,,
Brass unions for lead pipe (ditto)	,,
Barrel ditto, screwed for iron pipe (ditto)	,,
Brass washer, plug, and chain (ditto)	,,
Brass stop-cock, screw bottom with brass spanner (ditto)	,,
Ditto, bib-cock, screw bottom and boss (ditto)	,,
Ditto, ball-cock, screw bottom and boss, and copper ball (ditto)	,,
Ditto, equilibrium ball valves and copper balls (ditto)	,,
Ditto, high-pressure diaphragm stop-valves (ditto) ..	,,
Ends of rolls, bossed and soldered	,,

Extra to forming cesspools	At per number.
3 in. lead outlet pipes and soldering (stating length)	,,
Full-sized bright pan closet, with copper fan, round valve, ball lever, cranks, and copper wire	,,
Ditto pan closet, with supply valve, and Underhay's patent regulator, sunk dish and blue basin	,,
Elastic valve closet, with supply valve, and Underhay's regulator, sunk dish with cut glass handle, blue basin	,,
Lead D traps	,,
Ditto service boxes	,,
Wash-hand basins and lavatories (stating size) and description	,,
Urinals (ditto)	,,

Zinc-Worker.

The measurement of zinc work is so very similar to that of plumbers' work, that the following remarks will suffice. The difference is that whereas leadwork is valued by weight, zinc is charged by the foot superficial, the different qualities of the material being specified by numerals. In billing, therefore, it is necessary to specify the number of the gauge of the zinc, and any other observations which it may be requisite to state in regard to the workmanship.

The following articles, which I have not described in the Plumber, I will briefly enumerate here. Gutter and rain-water pipes are measured by the foot run, stating the sizes in each case, and the description. Number the stopped ends and outlets to gutters, and the heads and shoes to rain-water pipes, also the ears, swan-necks, &c., &c., giving sizes and descriptions where required.

Zinc tallboys, ventilators, and other similar items are numbered.

Zinc skylights are generally valued at per foot superficial, extra being charged for sliding or other ventilators in the same.

Metal lights are also measured by the foot superficial. It is necessary that a full description should be given, stating whether plain or ornamental.

Speaking pipes are measured by the foot run, numbering all elbows as extra only: also numbering all mouthpieces, whistles, &c., and giving description.

Table XIV.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

Malleable zinc in flats, &c., including all labour, No. 13 gauge	Per foot superficial.
Ditto in gutters. No. 12	,,
4 in. O. G. gutter	At per foot run.
Stopped ends	At per number.
Outlets	,,
3 in. rain-water pipe	At per foot run.
Square heads	At per number.
Shoes	,,
Ears	,,
Ventilators (giving description)	,,
Tallboys (giving description)	,,
Metal lights (ditto)	,,
Speaking tube	At per foot run.
Extra to elbows	At per number.
Flexible tube	At per foot run.
Mouthpieces	At per number.
Whistles and chains	,,

CHAPTER XI.

PAINTER.

COMMENCEMENT—STAIRCASE—SOME SURVEYORS ALLOW FOR—CUT IN—HOW BILLED—SASHES AND FRAMES—CASEMENT FRAMES—STONE SILLS—PLINTHS, CORNICES, &c.—GUTTERING—RAIN-WATER PIPES—CRESTING—RAILINGS—GATES—BALCONIES, &c.—DOOR-KNOCKERS, &c.—INSIDE WORK—HOW TO MEASURE—WINDOWS—WINDOW BACK—PANELS—BOXING SHUTTERS—SKIRTINGS—DADOS—DOORS AND LININGS—STRINGS—BALUSTERS, HANDRAILS, AND NEWELS—KNOTTING AND STOPPING—MOULDINGS CUT IN—COMMON COLOURS—GRAINED WORK—STAINING—TABLE OF WORK—FRENCH POLISHER—WRITER—GILDER—TABLE OF WORK.

ADOPT the same systematic method in taking off the painters' work as recommended to the other trades. Take firstly the outside work. In proceeding with the inside, complete one floor before commencing a second, and take the staircase last. Many of the dimensions will be the same as those of the joiner, and may be taken therefrom. In some cases where the surveyor is hurried, he neglects to measure the painting at all, but takes the superficial quantity of work to be painted from the joiner's bill, and adds thereto one-seventh of the total as an allowance for the edges. In small matters, where the work executed is very ordinary, the difference between this course and the correct way would be slight, owing to the price per yard for painting being inconsiderable, but in first-class work, or where there is a large quantity of painting required, it is not to be tolerated. I do not recommend it in any case. Measure the entire surface covered by the brush; that is, including all rebates, sinkings, &c., and taking the girth of the mouldings as shown in Fig. 35, page 82, *ante*. Where the work has to be "cut in on both edges," that is, worked to a line as in the case of skirtings, &c., additional labour is involved, and the customary rule is to measure this description of work by the foot run.

Paintwork in general is measured by the foot superficial, which is afterwards reduced to the yard superficial, and billed accordingly. Lineal dimensions are billed at per foot. The following is the customary method of measuring the various items for painting, and the order recommended for taking them:—

Outside Work.—Sash frames and sashes are numbered, and the sash squares are afterwards reduced and billed at per dozen, as shown in the Table, stating whether large or small squares. Casement frames are also numbered, and it will be necessary to state the number of lights, whether two, three, four, or six light casement, or as the case may be; also, if large it must be so specified, and this will apply equally to sash frames. By "large," is meant anything beyond the ordinary sizes. Cement fronts are measured by the yard superficial. Stone sills are numbered. Reveals and soffits to the windows would be measured by the foot run, except where the front is of cement, in which case it would be measured with and as the front. Measure plinths, string courses, cornices, copings, &c., in a similar manner, and where done from ladders or scaffolding the work must be kept separate from the general item for painting in the bill, and described according to the manner in which it is executed. Eaves guttering is measured by the foot run, and the stopped ends, clips, outlet pipes, swan-necks, &c., numbered. Rain-water pipes are also measured by the foot run, numbering the heads, stating whether ornamental or otherwise; also the shoes, ears, &c., &c. Iron cresting is measured by the foot run, and all finials numbered, and iron railings are measured by the yard superficial; as are also gates, ornamental railings, balconies, balconettes, &c. Door-knockers, knobs, scrapers, and other items of a similar nature are numbered.

Inside Work.—Having completed the outside, proceed to the inside. It is advisable to observe the following rule in measuring framed and other works, namely;—to measure all projections for panels, mouldings, &c., in the dimension for the height only, and all returns in that for the width. Keeping this in mind, the work is tolerably easy.

Sashes and Frames, &c.—Measure firstly the windows, taking the width from out to out, that is, from the edge of one architrave moulding, to that of the other, and add the two returns

against the wall; for the height, take from the under side of window board to the top of architrave, exclusive of the returns to wall. If, however, there is a window back, take the dimension for the height from the floor. It will be necessary to add to this dimension the allowances for projections and mouldings in panels, &c., whatever the girth exceeds the flat, but, as I have just stated, not the returns. In ordinary square framed panels the allowance for each panel is one inch.

Boxing Shutters, &c., are measured the width by the height. For the width take the width across the window, and add to this 2 feet 6 inches, to allow for the edges and the inside of boxings, &c. The height would be obtained in the way already mentioned. The lengths for back linings should be collected on Waste and taken in one dimension; this by the width will give the area. The elbows are measured the width by the height, adding to the latter for any panels, &c., as before. These remarks will also apply to back flaps, and sliding shutters, which are all measured in the same way. In the latter case do not omit the flap. The sash squares are numbered as described to outside, and shutter bars are also numbered.

Skirtings are measured by the foot run, the length by the girth, from floor line to wall line.

Dados are measured by the yard superficial, the length by the height, adding to the latter for the projections and whatever the girth of the mouldings exceeds the flat surface of the same.

Doors and Linings.—In measuring doors take the width of the door, including grounds and architrave, adding whatever the returns measure. For the height take from the floor to the top of the architrave, and add for the extra to the girth of the architrave, and also for the panels, but not the returns. The jamb linings are measured the total length, that is, twice the height of the door *plus* the length of the soffit, by the width of the lining *plus* the thickness of the door (for the edges of the same) and the width of the rebate.

Strings to staircases are taken as described to other work where cut in on both edges, that is, by the foot run. Balusters, handrail, and newels are taken by the foot run. Ornamental iron balusters and newels should be numbered.

I think sufficient has been written to show my readers how this description of work should be measured. Of course it will be necessary to keep the works differently treated separate, stating in each case the number of oils in which it is to be painted, also if knotting and stopping are included, which in new work would be the case. If flatted, take the flatting coat as extra, and where the painting is to be finished in ornamental colours, take the latter as extra; specify the tint. I give an example in the Table. Where mouldings are "cut in" in party colours they are measured by the foot run, as extra to the framing. By the common colours are understood the ochres, umbers, Venetian red, lamp-black, red-lead, and Spanish brown.

Grained Work is measured as extra to the painting, by which is meant that the work having been already measured for the painting, the item is taken again for the extra price for graining. It is measured in precisely the same manner as described to paintwork. State the nature of the imitation, whether wainscot, pollard oak, mahogany, bird's-eye maple, &c., and the quality and number of coats of varnish to be applied.

Staining is also measured in the same way as paintwork, specifying the stain, and coats of varnish as before.

French Polishing is measured as shown in the accompanying Table. It is customarily taken off with the Joiner, thus preventing the possibility of its omission, which otherwise might be the case. It is also generally included in the "bill" with the item to which it relates, consequently a separate bill is not made. I have thought it best to call attention to it in the manner shown.

Table XV.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

—— times in oil on woodwork	At per yard super.
Ditto on cement	,,
Ornamental railings, gates, &c., both sides	,,
Skylights	,,
Carved work	At per foot super.
Skirting 12 in. girth and under	At per foot run.
Strings	,,
Chair-rail	,,

Handrail	At per foot run.
Balusters	,,
Newels	,,
Rain-water pipes	,,
Ornamental heads	At per number.
Ears	,,
Shoes	,,
Eaves gutter	At per foot run.
Stopped ends ditto	At per number.
Outlets ditto	,,
Swan-necks ditto	,,
Cement reveals	At per foot run.
Cornices under girth	,,
Window sills	,,
Coping edge	,,
Stone strings	,,
Stone plinths	,,
Iron cresting	,,
Guard bars	,,
Sash frames	At per number.
Small ditto	,,
Two-light casement frames	,,
Four ditto ditto	,,
Sash squares	At per dozen.
Brackets	At per number.
Quatrefoils	,,
Finials	,,
Step-ladder	,,
Dresser	,,
Chimney-pieces	,,
Scrapers	,,
Extra to flatting to chosen tint	At per yard super.
Four oils and extra finished French grey	,,

GRAINER.

Extra grain in imitation wainscot and twice varnish	,,
Ditto enrichments in panels 4 in. wide	At per foot run.

STAINER.

Staining to an approved tint and twice varnishing with the best copal varnish	At per foot super.

FRENCH POLISHER.

French polishing	At per foot super.
Ditto to handrails, &c.	At per foot run.

WRITER.

Writing is measured by the inch run, stating the height of the letters. Specify whether painted simply plain, or if shaded, double shaded, or gilt letters, &c., &c. If the writing is to be

executed on a glazed surface it must be so stated, the price being considerably in advance of the ordinary for that description of work. It is also necessary to state the style of writing required, whether Egyptian, Old English, Antique, &c., &c. Work other than the foregoing is charged at special prices.

WRITER.

Ordinary style, stating height. *Note.* This style includes Egyptian, Old English, and German Text	At per inch run.
Ornamental style, stating height as above. *Note.* This style includes Antique and all others not included in the first item	„

GILDER.

The following Table will explain the method of measuring gilder's work:—

TABLE XVI.

Gilding on flat surface	At per foot super.
Ditto on carved work, stating height and description	At per foot run.
Moulded work, stating girth	„
Beads, &c., ditto	„
Carved caps	At per number.
Bosses and single items of similar nature	„

CHAPTER XII.

GLAZIER.

WORK, HOW MEASURED — BILLED — SEMICIRCULAR SHEETS — BENT GLASS — COLOURED OR EMBOSSED GLASS — CUTTING TO SEGMENTAL HEADS — LEAD LIGHTS — TRACERY — GLASS TILES AND SLATES — TABLE OF WORK.

THE measurement of glaziers' work is as follows. Take the extreme dimensions in every case between the rebates, and make no deductions for irregular surfaces. All fractional parts of an inch are to be taken as full inches in each of the dimensions. State the description and quality of the glass, and keep the different descriptions separate; also keep separate and state the superficial area of each of the squares where they exceed 3 feet, as illustrated in the following Table, stating, firstly, that under 3 feet super in a square, then that under 4 feet, and so on. Also take the glass in the order shown therein, namely, the inferior description firstly, and so on, to the best, though this course is dependent upon circumstances. Where so taken, however, the whole of each description of glass can be abstracted in one item; and, in many cases, an abstract can be dispensed with, and the quantities billed direct from the dimensions. Measure *semicircular sheets* as if square, taking the largest dimensions for length and height.

Glass bent to a given radius, and to elliptical or other curves, or both ways of the glass, must be kept separate, and described accordingly. Coloured or embossed glass is measured by the foot superficial, the margins being taken by the foot run, and the corners enumerated, stating the sizes.

Take *cutting* to segmental heads by the foot run; and in the case of cuttings to small quadrant corners, it is best to number them.

I think the reader will find the Table sufficiently explicit to need no further explanation here.

I would mention, in conclusion, that glazing in lead lights

must be specified separately, and fully described, stating the sizes of the squares, or the prime cost value of the whole per foot super. Number all spandrels in tracery heads, stating the extreme dimensions, including all cutting, and stating whether trefoils, quatrefoils, &c. &c.; and, if irregular shapes, giving sketches. I have given a specimen of this description at the end of the Table.

Glass tiles and slates are numbered, stating the sizes and thicknesses.

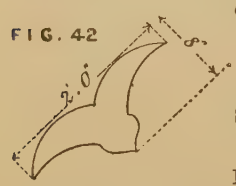
Table XVII.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

21 oz. sheet glass, under 3 ft. super in a square	At per ft. super.
32 oz. ditto ditto, under 4 ft. super in a square	,,
Ditto ditto, under 6 ft. super in a square	,,
16 oz. obscured sheet glass, under 3 ft. super ditto ..	,,
Ditto fluted ditto ditto	,,
Hartley's patent rolled plate glass, $\frac{1}{8}$ in. thick, under 5 ft. super in a square	At per ft. super.
$\frac{3}{4}$ in. rough plate glass in 6 in. widths, and glazing in iron grating	,,
21 oz. best patent plate glass, under 12 ft. super in a square	,,
Best British plate $\frac{3}{16}$ in. thick, under 10 ft. super in a square	,,
Ditto ditto, under 12 ft. super in a square	,,
Ditto ditto, bent to 3 ft. radius, under 4 ft. super in a square	,,
Ditto ditto, ground and embossed to design, under 6 ft. super in a square	,,
Cutting to semicircular or segmented heads	At per foot run.
Small quadrant cuttings	At per number.

The following is the customary method of measuring church windows.

FIG. 42



Cathedral glass and glazing in strong lead quarry lights, with narrow diapered margins of prime cost value of per foot super.	At per ft. super.
Spandrels 8 in. × 6 in. extreme size, glazed as above in tracery heads	At per number.
Ditto 2 ft. × 8 in., ditto as sketch	,,
Trefoils 18 in. × 12 in., ditto ditto	,,
Quatrefoils 30 in. × 30 in., ditto ditto	,,

CHAPTER XIII.

PAPERHANGER.

METHOD OF FINDING NUMBER OF PIECES OF PAPER—PREPARING WALLS—BORDERS AND HANGINGS—TABLE OF WORK.

THE measurement of paperhangers' work is fully shown in the following table. Take the lengths and heights of walls, making the several deductions for doors, windows, fireplaces, &c., and bring to the foot superficial. By dividing the product by 60, the number of superficial feet in one piece of paper, we obtain the number of pieces required for the different apartments. All portions of a piece are to be taken as full pieces; that is, the number of odd feet remaining of the various descriptions. Preparing walls for paper is measured in a similar manner to the foregoing. It may be observed that most of the dimensions for the foregoing can be obtained from those of the plastering, and that for preparing walls will be, of course, simply the addition of the total number of pieces of paper hung.

Measure all borders and hanging, by the dozen yards lineal.

TABLE XVIII.

This Table has a double use; it shows the order of taking this Trade, and the method of Measurement.

Paper of p. c. value of 1*s.* per piece, and hanging same	At per piece.
Ditto ditto, p. c. value 2*s.* per piece, and ditto ..	„
Ditto ditto lining paper and ditto	„
Marble paper p. c. value 2*s.* 6*d.* per piece, sizing and twice varnishing in best copal varnish	„
Preparing walls for paper	„
Border p. c. 1*s.*, and hanging same	At per doz. yards run.

CHAPTER XIV.

ABSTRACTING AND BILLING.

USUALLY DONE BY JUNIORS—ORDER OF ITEMS IN ABSTRACT—DIRECTIONS AS TO ABSTRACTING—CUBICAL ITEMS—SUPERS—RUNNING—SPACE—BRICKLAYER—CARPENTER AND JOINER—BILLING—DESCRIPTION OF MATERIALS—CONDITIONS OF CONTRACT—INSURANCE—MAINTAINING WORKS—SURVEYORS' CHARGES—COST OF LITHOGRAPHY.

A WORD or two on abstracting and billing the quantities, before bringing my subject to a close. These may appear trivial, when compared to the labour and skill required in "taking off"—and so, indeed, they are. Usually they are placed in the hands of a junior, and to him I will, therefore, particularly address my observations. Many surveyors are very particular as to the manner in which their abstracts are prepared—and rightly so. Any item ought to be as readily found in the abstract as it is in the bill; and it should be so arranged that the items follow each other in the same order as they appear afterwards in the bill, the latter being, of course, merely a *summary* of the former. As I have in my Tables given the order of the various items in each trade, it will be unnecessary for me to recapitulate them here. I can always tell whether a man has had much experience in quantities by the manner in which he prepares his abstract. Items are misplaced, and, owing to a want of forethought and experience, insufficient room has been allotted for their insertion in their proper places. It would be, of course, impossible for me to lay down any specific rule for the guidance of young surveyors, as, of necessity, it must be varied to suit the job; but the following remarks may not be inopportune, and may be applied in every case:—

Glance through the dimensions before commencing the abstract, so as to obtain an approximate idea of its nature—that

is, of the class of building. If a large, first-class building, the items are likely to be multifarious. Use plenty of paper, and keep the items sufficiently far apart to admit of a few interlineations, which are likely to occur afterwards, where the items are not taken out in regular order.

Take every trade on a separate sheet of paper, except in very small jobs. As a rule, take the cubical items firstly, then the "supers," then the "runs," and lastly the numbered. In each case, those of the least value should be placed first, and the others should follow in order according to their relative values, the most expensive, consequently, appearing last. There is, however, an exception to this, in the case of articles measured at per foot run, which, as in the case of the mason, carpenter, and joiner, are measured in the order of their scantlings in preference to that of their value, those of the smallest scantling being taken first. Also in the case of "supers," articles that are measured by the rod or square are placed in advance of those measured by the foot. The amount of space to be allotted to the various items depends upon the size of the job, and a little experience is therefore necessary. Care should be taken to leave sufficient space to reduce the items to the standard or weight, where such is necessary, as in the case of brickwork, ironwork, &c. I have explained the method of abstracting the bricklayer when speaking of that trade, and I would add that very little difficulty will be experienced in any of the trades where the person has a practical acquaintance with building. The carpenter and joiners' trades are perhaps the most complicated, but with a little experience they are easily overcome, if the student always pursues a certain course, and that I suggest is the one generally adopted, and I think the best.

With respect to "billing," that is, bringing the summary of the dimensions from the abstract into the form of a bill, for the purpose of enabling the builders to price them, this is simple enough. The student has only to copy the various items, in the order in which they appear in the abstract, keeping each trade separate. In a large job, each trade is made a separate bill of, and the total of the estimate carried to a summary; but in a small bill this is seldom the case, the bill being continuous.

It is customary to give a description of the materials to be used in the several trades, before taking the items, such description being taken from the specification. Some, however, prefer to keep them apart from the dimensions, and place them before the quantities; in which case they form a sort of preface.

Conditions of contract are sometimes attached to the quantities, and should, I think, always be so attached. At the end of each trade it is customary to provide an item for "Attending upon the other trades," leaving all clean and perfect at completion, &c., &c. In the summary make provision, where it is required, for "Insurance," "Maintaining works for——months after final certificate of completion," and any other incidentals that may be required, and lastly, but not the least, for surveyor's charges for "taking off" the quantities, and the cost of lithography, &c.

CHAPTER XV.

REPAIRS.

DIFFICULTY OF DEALING WITH PRACTICE OF LUMPING—PIECING STONES—TAKING DOWN WALLS—RENEWAL OF JOINTS—RAKING OUT POINTING—DECAYED STONE—DRAINS AND TRAPS—CHIMNEYS—STOVE BACKS—PAINTWORK—HACKING OUT—IRON FENCING—PAVEMENT—TABLE OF REPARATIONS—MATCHING PAPER—DAY WORK.

THE experienced quantity surveyor is often puzzled when he has to deal with repairs and alterations.

Certainly, compared to new buildings, the difficulties are far greater in old buildings and alterations. Therefore a ready expedient is often resorted to of "lumping," which though in practice is most usually "near the mark," cannot be recommended, for the reason that the object of quantities is to give exactitude, and *not a near approach* to the measurement.

Let me instance a few of the difficulties in this branch of the subject.

1st. Piecing stories.

2nd. Taking down walls out of the perpendicular, and rebuilding, with all the incidence of scaffolding of a special nature; the using in of some part (what part?) of the old bricks; the making good of disturbed internal work; the making good of the peculiar cornices and skirtings.

3rd. The removal and reinstatement of rotten joists, and the renewal of disturbed ceilings and other parts of the building.

4th. Raking out and pointing portions of the walls, and estimating what scaffolding (if any) will be requisite.

5th. The quantity of labour to repair decayed stone in sinks and other parts.

6th. The reinstatement of drains and traps; the difficulty is great, as so often the stoppage is underground.

7th. The chimneys, chimney-pots, and reinstatement of injury to chimney-pieces.

8th. The money value of reinstatement of stove backs and fronts.

9th. The reinstatement of injured paintwork; what quantity or number of coats is sufficient to make good.

10th. The value of *hacking* out.

11th. The injury to iron fencing.

12th. The taking up broken and putting sound pavement.

All these show the difficulties which attend this small branch of my subject; and they are only to be overcome by practice. I can merely give the outline to guide.

REPARATIONS.

Table XIX.

This Table has a double use; it shows the order of taking the items, and the method of Measurement.

Bricklayer and Tiler.

All open joints to brick flat or brick-on-edge coping	At per foot super.
Defective filletings	At per foot run.
Defective tile creasing	,,
Pointing to pantiling	,,
Removing defective tiles, finding and bedding sound	,,
Taking down bulged, cracked, or split brickwork, and rebuilding, including scaffolding	At per rod.

Note.—Allowance must be made for the bricks that are sound, and can therefore be re-used.

Sound chimney-pots and setting	At per number.
Pointing open joints of brickwork	At per foot super.

Note.—State height from ground, and whether scaffolding will be required, and what kind.

Cespools, if they require emptying	At per ton.
Earth, soil and rubbish. Quantity must be taken and distances to which they are to be carted	At per yard cube.
Sash frames / Door frames } The quantity of pointing required ..	At per foot run.

Slater.

The removal of broken or defective slates. The re-fixing of loose	At per number.
The re-nailing	At per square.
Ridging defective or deficient	At per foot run.
Shelves, slabs, paving	At per foot super

Carpenter.

The removal of broken or decayed rafters, purlins, wall plates, joists, and replacing with sound	At per foot cube.
The removing of broken laths and replacement with sound	At per square.
The re-fixing loose boarding and weather boarding ..	,,
The providing new ditto in lieu of decayed, and fixing	,,
The providing sound wooden gutters and trunks, and fixing, including removal of old	At per foot run.
Removing decayed boarding to dormers, roofs, gutters, and flats, and reinstating with sound	At per foot super.
The reinstatement of decayed skylight bars	At per foot run.
The removal of decayed sills of sash and door frames, and providing and fixing sound	,,

Note.—Be sure to notice if those to be removed are oak or deal, &c.

The removal of broken sash-lines, and providing and fixing new	At per number.
Providing new beads	At per foot run.
Ditto pocket pieces	At per number.
Piecing cut bars	,,
Providing and fixing sound in lieu of decayed rails and sashes	At per foot run.
Sound panels in lieu of split in doors	At per foot super.
Making good injuries to stiles or rails	At per foot run.
Nosings to stairs	,,
New treads	At per foot super.

Mason and Pavior.

Copings	As described to new work.
Curbs	,,
Channels	,,
Sinks	,,
Sink stone	,,
Steps and landings; piecing must only be taken where it can be done	,,
Walls or other masonry if loose or unsound	,,
Paving (remembering that the existing though broken may be squared and re-used, the new quantity required will only be *sufficient* to cover the space after all the stones are squared and used	At per foot super. Labour to squaring edges at per foot run.
Taking up sunk paving and relaying to proper level	At per foot super.
Chimney-pieces cleaning	At per number.
Ditto reinstating	,,
Ditto where chipped making good	,,
Hearths, front and back	At per foot super.
Pointing to decayed or open joints	At per foot run.
Cramps, defective	At per number.
Ditto reparation	,,

Ashlaring and other stone works, and reparation of parts broken .. .. As new work.

NOTE.—It must be remembered all stonework may be made good by *piecing*.

PLASTERER.

Cutting out cracked or bulged ceiling, plaster and set, or plaster, float, and set .. .. At per yard super.

NOTE.—If re-lathing necessary, add lathing.

Cutting out loose or bulged plastering of walls, render and set, or render, float, and set .. .. At per yard.

(Remember this will necessitate an addition in Painter, of making good paper, or of colouring, as the case may be.)

Enrichments, mouldings, skirting, and cornices .. As new work.

(A special price must be placed if the work is old-fashioned, or there is a difficulty in *matching* it for any good reason.)

Repairing cement work of fronts .. .. At per yard super.
Copings .. .. As new work.
Cornices .. .. ,,
Trusses .. .. ,,
Caps .. .. ,,
Sills .. .. ,,
Plinths and stringings .. .. ,,
Reveals .. .. ,,
Dressings .. .. ,,

PLUMBER AND ZINC-WORKER.

Re-fixing loose work on flats or flashings .. .. .. As new work.
Removing inefficient lead or zincwork, and providing and laying new .. .. ,,
Soldering .. .. At per foot run.
Repairing flashings, ridges, hips, valleys, aprons, dormer tops, cheeks, cisterns .. .. At per weight.
Rain-water pipes and heads. Care must be taken that the design of present head is followed in the new work .. .. At per foot run.
Sinks .. .. At per weight.
Pipes of all other kinds .. .. At per foot run.
Water-closet apparatus .. .. At per number.
Water-closet pans .. .. ,,

PAINTER.

Rub down and paint in coats of oil colour .. .. .. At per yard.

GLAZIER.

Hack out and re-glaze .. .. At per foot super.
Make good decayed putties .. .. At per foot run.
Reinstate bandings and cementings of lead lights .. At per number.

SMITH AND IRONMONGER.

Iron railings. (Particular care is required as to pattern; a sketch should be given.) .. .. .. At per weight.

Gratings	At per weight.
Gates, making good	At per foot super.
„ hanging or fastening	At per number.
Rain-water pipes	At per foot run.
„ shoes	At per number.
„ gutters	At per foot run.
„ cistern-heads	At per number.
Iron doors	„
Linings to doors	At per foot super.
Locks	At per number.
Latches	„
Hinges	„
Bolts	„
Bars	„

NOTE.—In taking the quantity, state if new required or reparation; if the latter, if new springs, or what requisite has to be supplied.

Beams	At per weight.
Columns	„
Ties	„
Supports	„
Balconies or balconets	„

(When unsafe or defective, it will be necessary to carefully take the exact work requisite to make them secure and perfect.)

PAPERHANGER.

Paper	At per piece.
Canvas	At per yard.

In taking the quantity of paper, the surveyor must try to find out if the pattern can be matched, as if so, only the reparation must be taken; if it cannot be, then the papering of the entire room must be taken in the quantities.

In concluding this portion of the subject, I may, perhaps, mention that it is seldom the surveyor takes the trouble of measuring up what is necessary in the shape of repairs, as in most cases the specification is handed to the builder, and he prepares his estimate therefrom, taking his own dimensions from the building; and whatever is done extra thereto is customarily charged as daywork, i. e. the time expended on the labour, and the quantity of material used. But, at the same time, how is the surveyor to estimate the cost of dilapidations, for example, without measuring the various items? That in many cases they are not measured is proved by the wondrous difference in their estimates. I have given, therefore, this

Table for the guidance of such as are disposed to adopt the most business-like method of treating repairs. Of course the items are taken, in many cases, the same as new work; but a full description must be given as to the requirements, as the price will be considerably in advance of the new. Great care is necessary, therefore, when dealing with repairs.

CHAPTER XVI.

ABBREVIATIONS.

ADOPTED COMMONLY BY THE PROFESSION—IN SOME CASES UNADVISABLE—VARY—SAME SYSTEM THROUGHOUT THE PROFESSION—CLASSIFICATION OF—MORE USED IN JOINER—TABLE OF.

IN concluding my subject on the measurement of builders' work, I give some of the more common abbreviations adopted by the profession to shorten, in some measure, the task of so much writing, in describing the various items. I have already stated that abbreviations, whilst of service to the more mature members of the profession in taking off the quantities, are, in certain cases, unadvisable—where, for instance, the dimensions had to be abstracted by a second person, who, if he does not understand them, will lose the time, in finding out, that was gained by the person taking off. Again, abbreviations vary so. Persons adopt their own, and each system may be different. When, however, the person taking off also abstracts and bills, abbreviations are, to a certain extent, advantageous, owing to the saving of time; but as, at a future period, a question may arise, and a second individual have to go over the items, my objection will, I think, hold good. Still, there is no reason why the same system of abbreviating should not be pursued throughout the profession, and then all would be right. I submit the following, therefore, as being the most usual, and those most frequently applied. All uncommon items or expressions should invariably be written *in extenso*. I classify them according to the trades. They are used more extensively in the Joiner than in any other trade.

TABLE.

Bricklayer.

Item.	*Abbreviation.*
Brick	B., as 1 B. (indicating the thickness of wall), B. on edge, B. flat.
Bedded and pointed	B. & P., as Frames B. & P.
Pargeted and cored	P. & C., as Flues P. & C.
Rough cutting	R. C.
Cutting to skewbacks	C. to Skew.
Relieving arches	R. A.
Bird's mouth	B. M.
Squint quoin	S. Q.

Mason.

Half-sawing	½ Sawg.
Plain work in beds and joints	P. W. in B. & J.
Plain face	P. F.
Sunk face	S. F.
Moulded face	M. F.
Circular plain face	C. P. F.
Fair ends	F. E.
Ends cut and pinned	Ends C. & P.
Weathered and throated	W. & T.

Carpenter and Joiner.

Deal	D.
Rough	R.
Wrought one side	W. 1 S.
Framed	F.
Beaded	B.
Braced	Br.
Chamfered	Ch.
Splayed	Sp.
Moulded	M.
Rebated	R.
Feather-edged springer	F. E. S.
Tilting fillet	T. Fillet.
Herring-bone strutting	H. B. S.
Boarding	B.
Proper door case	P. D. C.
Deal wrought, rebated, and beaded frame	D. W. R. & B. Frame.
Double rebated and beaded jamb linings	D. R. & B. J. Linings.
Proper ledged door	P. L. Door.
Six-panel deal double-margined door—the lower panels bead flush and square, and the four upper panels bolection moulded and raised one side, and bead butt at back	6 P. D. D. Margd. D. Lower P. B. F. & Sqre., 4 up. P. Bol. M. & Raised 1 S. & B. B. at back.

Deal cased frames, oak, sunk sills, 1½ in. ovolo moulded sashes, double hung with brass axle pulleys, patent lines, and iron weights	D. C. F., O.; S. C. 1½ O. M. S; D. H.; B. A. P.; P. L.; & I. W.
Treads and risers, with moulded nosings, and strong fir carriages, glued, blocked, and bracketed	T. & Risers; M. N.; & S. F. C.; G. B. & B.
Wrought, rebated, and beaded outer string ..	W. R. & B. Outer String.
Rounded ends	R. E.
Returned ends	Retd. E.
Mitres	M.

SMITH AND FOUNDER.

Wrought iron	W. I.
Cast iron	C. I.
Chimney bar	C. B.
Rain-water pipes	R. W. P.

PLASTERER.

Render	R.
Render, float, and set	R. F. & S.
Lath, plaster, float, and set	L. P. F. & S.
Lath, plaster, float, set, and twice whiten	L. P. F. S. 2ce. W.
Stucco	S.
Wash,s top, and whiten	W. S. & W.
Twice	2ce.

PAINTER.

Oils	O.
Flatted	F.
Grained	G.
Varnished	V.
Stained	S.

CHAPTER XVII.

RÉSUMÉ AND CONCLUSION.

RECAPITULATION—ATTENTION DRAWN TO THE SUBJECT—ASSISTANCE TO STUDENTS—UNIFORMITY TO BE DESIRED—REFERENCE WORK—TABULATED FORM—ASSISTANCE TO SURVEYOR—SYSTEM—WANT OF CARE—INSTANCE OF OMISSIONS—DESIGN—QUANTITIES SAFER—PAY WELL.

LAND at last! How I can sympathize with the expression! The yearnings of the sailor for land and home can scarcely exceed in intensity the feelings for *Finis* which a writer on a strictly technical subject has.

Of course the prosaic will say, Why write at all? or, at all events, consider the payment you receive its equivalent.

Yet I venture to think my readers will judge otherwise. They will appreciate the efforts that I have made to render these articles a *text*-work on this subject, to be referred to at all times. First, however, let me recapitulate the objects I have had in view:—

1st. The drawing attention to this particular subject, which has been, and is, much neglected.

2nd. Enabling students, in the most concise and easy method, to acquire this branch of the profession.

3rd. To bring, what I venture to consider, the true practice before the large and rising body of the profession, that it may be criticised, and in the result we shall obtain uniformity, which, I am sure, all must desire.

4th. To make a work of reference for the maturer members. At present there is no work which can be called a text-book or guide.

5th. By the use of the tabulated form to render these pages most easy of reference; and for economy of space I have made my Tables answer a double purpose.

I may mention I have used this tabulated method from the

great success which has attended (even beyond my expectations) the same principle which I first adopted in "Dilapidations."

There can be no doubt, I opine, that the most careful quantity surveyor will find an advantage in having these Tables before him; it will prevent his missing any item, and this being the case, how much greater must be the advantage to the less experienced man! It is to such an one almost his alpha and omega.

Never, probably, could the reply of that celebrated man, who, when asked how it was that he accomplished so much, made answer, "System, sir—system," be more appropriate than here. No subject requires it more; and it is only by system and method that the most experienced surveyor can hope to avoid *omissions*.

What a fruitful subject that one word suggests—the looming in the future of actions by builders because our quantity surveyor had omitted an item.* Marvellous is it that nowadays there is not one profession which is not threatened, at some time or other, with the strong arm of the law. We have just shown that the quantity surveyor is not free. The architect and the surveyor I need scarcely mention, as all my readers well know the liabilities we are exposed to; the lawyer (with him we, perhaps, have less sympathy), the auctioneer, the medical man, &c.—scarcely a week passes that you do not read in the papers of some action for want of *due caution* or want of *proper skill*, and where, in consequence, compensation is claimed in the action against the professional man.

If my reader has carefully gone through these papers, and will refer to the Tables on all occasions, I believe he will be master of the subject, and that no matter of what building he has to take out the quantities, he will be able to do so in a satisfactory manner; in fact, he will find a pleasure in his work, and even sigh for some more difficult building. None can I mention, except the fancy of the poet, which must estop

* I well remember two instances of important omissions by different quantity surveyors, both men of experience—one case where the whole of the sleeper walls were omitted in the quantities of a large public building; the other where the surveyor omitted the figure 2 before the dimensions, thereby entirely omitting *one wing* of the hospital.

the energy of the *quantity surveyor*. Imagine the quantities required of the following, with prices:—

"Build the entrance high and proud,
Darkening and eke brightening,
Of a riven thunder-cloud
Veined with lightning.
Use one with an iris-stain,
For the door within,
Turning to a sound like rain,
As we enter in."

I mention this to show the "*practical*" man that there is a limit to his sphere, and when he can most fully accomplish "dilapidations" and "quantities," he need not rest content, but may essay the higher and more poetic—namely, designing. Should he do so, he must remember that he will have fewer rules to guide him; that he will leave firm ground, and be entirely at sea (in more senses than one); that what one critic will admire, another (of a different school) will condemn; that beauty and novelty will not atone for the design being of the wrong school. By wrong, I mean the school which is in the minority, or is the one which your critic condemns.

With "quantities" you are much safer, and they—no mean advantage in these times of high prices—pay well.

APPENDIX.

APPENDIX.

RELATIVE VALUE OF FRENCH AND BRITISH WEIGHTS, MEASURES, &c.

French.	WEIGHTS. CONTAINING	*British.*
Decamillier or Bar ..	10,000,000 grammes =	22050 pounds avoirdupois.
Millier	1,000,000 „ =	2205 „ „
Quintal	100,000 „ =	220·50 „ „
Myriagramme	10,000 „ =	22·050 „ „
Kilogramme	1,000 „ =	2·2050 „ „
Hectogramme	100 „ =	1543·4 grains „
Decagramme	10 „ =	154·34 „ „
Gramme	=	15·434 „ „
Decigramme or $\frac{1}{10}$ of a gramme	=	1·543 „ „
Centigramme or $\frac{1}{100}$ „	=	0·154 „ „
Milligramme or $\frac{1}{1000}$ „	=	0·015 „ „

French.	LENGTHS. CONTAINING	*British.*
Myriametre or	10,000 metres =	10936 yards.
Kilometre or	1,000 „ =	1093·6 „
Hectometre or	100 „ =	109·36 „
Decametre or	10 „ =	10·936 „
Metre	=	39·371 inches.
Decimetre or	$\frac{1}{10}$ of metre =	3·9371 „
Centimetre or	$\frac{1}{100}$ of metre =	0·3937 „
Millimetre or	$\frac{1}{1000}$ of metre =	0·0393 „ lineal.

French.	SUPERFICIES.	*British.*
Hectare or	100 ares =	11960 yards.
Decare or	10 ares =	1196·0 superficial yards.
Are	=	119·60 „
Deciare or	$\frac{1}{10}$ of are =	11·960 „
Centiare or	$\frac{1}{100}$ of are =	10·764 superficial feet.
Milliare or	$\frac{1}{1000}$ of are =	1·076 „

French.	CUBIC.	*British.*
Myrialitre	10,000 litres =	353·15 cubical feet.
Kilolitre	1,000 „ =	35·315 „
Hectolitre	100 „ =	3·531 „
Decalitre	10 „ ..	9·353 „
Litre	..	0·035 „

Decilitre, $\frac{1}{10}$ of litre.
Centilitre, $\frac{1}{100}$ of litre.
Millilitre, $\frac{1}{1000}$ of litre.

RELATIVE VALUE OF BRITISH AND FOREIGN SQUARE AND CUBIC MEASURES.

(*English Square Foot* 144 *inches, ditto Cube Foot* 1728 *inches.*)

Country or Place.	Sq. Foot in English Sq. Inches.	Cubic Foot in English Cubic Inches.	Country or Place.	Sq. Foot in English Sq. Inches.	Cubic Foot in English Cubic Inches.
Amsterdam	124·255	1385·070	Lisbon ..	167·547	2168·728
Berlin ..	148·693	1813·162	Prussia ..	152·670	1886·390
Berne ..	133·287	1538·798	Rhineland	152·670	1886·390
Dantzic ..	127·690	1442·897	Riga ..	116·424	1256·215
Dresden ..	124·099	1382·463	Rome ..	137·358	1609·835
France ..	163·558	2091·743	Spain ..	123·832	1378·002
Geneva ..	369·024	7088·951	Sweden ..	136·515	1595·041
Hanover ..	131·194	1502·696	Venice ..	187·142	2560·102
Leipsig ..	123·432	1371·329	Vienna ..	155·002	1929·774

RELATIVE VALUE OF BRITISH AND FOREIGN ROAD MEASURES.

(*The English Mile being* 1760 *Yards long.*)

Country or Place.	Name of Measure.	English Yards.	No. of each equal to 100 English Miles.
Denmark	Mile	8244	21·348
Flanders	League	6864	25·641
France	League of 2000 Toises ..	4263	41·285
Germany	Mile, long	10126	17·381
Hamburg	Mile	8244	21·348
Hanover	Mile	11559	15·226
Holland	Mile	8103	21·725
Hungary	Mile	9113	19·313
Netherlands	Mile, Metrical	1093	161·024
Poland	Mile, Long	8103	21·725
Portugal	League	6760	26·035
Prussia	Mile	8237	21·367
Russia	Verst	1067	150·814
Spain	League, Common	7416	23·732
Sweden	Mile	11700	15·042
Switzerland	Mile	9153	19·228
Turkey	Berri	1826	96·385

GENERAL TABLES.

BRICKLAYER.

1 cubic yard of clay will make about 450 bricks.
Stock bricks measure $8\frac{3}{4} \times 4\frac{1}{4} \times 2\frac{3}{4}$.
Paving bricks „ $9 \times 4\frac{1}{2} \times 1\frac{3}{4}$.
Dutch clinkers „ $6\frac{1}{4} \times 3 \times 1\frac{1}{2}$.
450 stock bricks weigh 1 ton.
1 rod of brickwork weighs 13 tons.

500 bricks
22 bushels sand, lime, &c.
36 hods, do.
27 feet cubic, do.
} = 1 load.

54 feet cubic = 1 double load.

Bricklayers' Hod

Measures 16″ × 9″ × 9″.
Will hold 20 bricks.
„ ½-bushel mortar nearly.

One Rod of Brickwork

= 272 feet super., 1½ brick thick.
= 408 „ 1 „
= 204 „ 2 „
= 163 „ 2½ „
= 136 „ 3 „
= 306 feet cubic.

One Rod of Brickwork contains :—

If laid dry in wells, &c. (about) 4900
„ walls, „ 5370 } Stocks.
If laid in mortar, „ 4350

One Superficial Foot of Reduced Brickwork contains :—

„ „ „ „ 16 bricks.
„ „ facing .. .. 7 „
„ „ gauged arches .. .. .. 10 „

One Yard of Bricknogging on Edge contains :—

„ „ „ 30 stocks.
„ „ laid flat .. .. .. 45 „

One Yard of Paving contains :—

Stock bricks laid flat 36
„ on edge 52
Paving bricks laid flat 36
„ on edge 82
Dutch clinkers laid flat 120
„ on edge 140

TILING.

A plain tile is $10\frac{1}{2}''$ long, and $6\frac{1}{2}''$ wide.
A pantile $13\frac{1}{2}''$ „ $9\frac{1}{2}''$ „

1000 tiles = 1 load.
1000 plain tiles weigh $22\frac{1}{4}$ cwts.
1000 pantiles „ 47 „

A plain tile lath is $1\frac{1}{2}''$ wide, and $\frac{1}{4}''$ thick.
A pantile „ $1\frac{1}{2}''$ „ $1''$ „
12 pantile laths 10 feet long = 1 bundle.
100 plain tile laths 5 feet long
125 „ „ 4 „
167 „ „ 3 „
500 feet „ any length
} 1 bundle.
30 bundles plain tile laths = 1 load.
Lathwood 6 feet long and 6 feet high = 1 fathom.

One Square of Tiling contains:—

600 plain tiles laid to a 4" gauge.
700 „ „ $3\frac{1}{2}$ „
800 „ „ 3 „
150 pantiles „ 12 „
164 „ „ 11 „
180 „ „ 10 „

One Square of Plain Tiles requires:—

1 bundle laths and nails.
1 peck tile-pins.
3 hods mortar.

One Square Pantiling requires:—

1 bundle laths and nails.
$1\frac{1}{4}$ hundred nails.

One square plain tiles weighs $14\frac{1}{2}$ cwt.
„ pantiles „ $7\frac{1}{2}$ „

SLATER.

1 square of slating = 100 feet superficial.
1200 slates = a thousand.
120 „ = a hundred.

Description.	Size.	Weight per M.
Doubles	13 × 6	15 cwt.
Ladies	15 × 8	$1\frac{1}{4}$ tons.
Countesses	20 × 10	2 „
Duchesses	24 × 12	3 „

The foregoing are sold by the thousand; the following, which are seldom used, by the ton. They vary in size, but are generally about

Imperials .. .. .. 30 × 24
Rags and Queens .. 36 × 24

To ascertain the number of slates required to cover a given area of roofing, take from the length of a slate the *lap* (that is as much as the third slate covers the first), divide the remainder by two, and multiply the quotient by the width of the slate, and the product will be the number of square inches covered by a single slate. By dividing the total area of the surface required to be covered by this, and that again by 144 (the square inches in a foot), the quotient will give the number required.

CARPENTER.

One Load contains:—

40 cubic feet of unhewn timber.
50 „ squared „
600 superficial feet of 1″ deal.
400 „ „ 1½ „
300 „ „ 2 „
240 „ „ 2½ „
200 „ „ 3 „
170 „ „ 3½ „
150 „ „ 4 „

66 cubic feet of deal
65 „ fir
60 „ elm
51 „ beech
45 „ ash
39 „ oak
34 „ mahogany
} = 1 ton.

Battens are 7 inches wide.
Deals „ 9 „
Planks „ 11 „

TABLE OF THE STANDARDS ADOPTED BY TIMBER MERCHANTS.

STANDARD.				HUNDRED.			
Name of Standard.	Standard.	Superficial area of 1″	Superficial area of 1¼″	Hundred.	Superficial area of 1″	Superficial area of 1¼″	Cubical Contents.	Relative Values.
Christiana	′ ″ 11 0 } 9 } 1¼	′ $10\frac{5}{16}$	′ $8\frac{1}{4}$	′ ″ 120/ 11 0 } 9 } 1¼ or 60/ 15 0 } 11 } 1¼	′ $1237\frac{1}{2}$	′ 990	′ $103\frac{1}{8}$	
Drammen	9 0 } 6½ } 2½	$12\frac{3}{16}$	$9\frac{3}{4}$	120/ 9 0 } 6½ } 2½ or 120/ 13 0 } 9 } 1¼ or 60/ 18 0 } 6½ } 2½	$1462\frac{1}{2}$	1170	$121\frac{7}{8}$	$1\frac{9}{11}$ of C. Standard.
Petersburg	12 0 } 11 } 1½	$16\frac{1}{2}$	″ 1½ 11	120/ 12 0 } 11 } 1½ or 60/ 12 0 } 11 } 3	1980	″ 3 660	165	$1\frac{3}{5}$ of C. Standard.
Quebec	12 0 } 11 } 2½	$27\frac{1}{2}$	″ 3 $9\frac{1}{6}$	100/ 12 0 } 11 } 2½ or 100/ 10 0 } 11 } 3	2750	$916\frac{2}{3}$	$229\frac{1}{6}$	$2\frac{2}{3}$ of C. Standard.
				120/ 10 0 } 11 } 3	= A long hundred.			

One Square of Flooring contains:—

100 superficial feet,

and requires

If laid rough	$12\frac{1}{4}$	12 feet deals.
„ edges shot	$12\frac{1}{2}$	
„ wrought and folding	$13\frac{1}{2}$	
„ wrought, ploughed, and tongued	14	
If laid rough	16	12 feet battens.
„ edges shot	$16\frac{1}{2}$	
„ wrought and folding	17	
„ wrought, ploughed, and tongued	18	

SMITH AND FOUNDER.

Several of the following Tables are taken from the valuable little handbook on the weights of iron, by Samuel Penn, published by James Hagger in 1870:—

SHEET IRON.

Weight of a Superficial Foot as per Birmingham Wire Gauge.

(*Penn.*)

No. of Gauge.	lb.	No. of Gauge.	lb.
1	12·55	14	3·23
2	11·25	15	2·97
3	10·45	16	2·62
4	9·55	17	2·19
5	8·66	18	1·92
6	8·34	19	1·7
7	7·5	20	1·41
8	6·64	21	1·32
9	6·29	22	1·15
10	5·5	23	·99
11	4·73	24	·95
12	4·3	25	·84
13	3·64	26	·78

(*Penn.*)

THE WEIGHT OF ONE FOOT OF FLAT IRON CLOSELY HAMMERED, IN POUNDS.

Breadth.	Parts of an inch in thickness.						
	$\frac{1}{4}$	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{7}{8}$	inch.
inches.	lb.	lb.	lb.	lb.	lb.	lb.	lb.
1	0·83	1·25	1·66	2·05	2·50	2·91	3·33
$1\frac{1}{8}$	0·93	1·4	1·87	2·34	2·81	3·28	3·75
$1\frac{1}{4}$	1·04	1·56	2·08	2·60	3·12	3·64	4·16
$1\frac{3}{8}$	1·14	1·71	2·29	2·86	3·40	4·01	4·58
$1\frac{1}{2}$	1·25	1·87	2·52	3·12	3·75	4·37	5·0
$1\frac{3}{4}$	1·45	2·18	2·91	3·64	4·37	5·10	5·83
2	1·66	2·5	3·33	4·16	5·00	5·83	6·66
$2\frac{1}{4}$	1·87	2·81	3·75	4·68	5·62	6·56	7·50
$2\frac{1}{2}$	2·08	3·12	4·16	5·20	6·25	7·29	8·33
$2\frac{3}{4}$	2·29	3·43	4·58	5·72	6·87	8·02	9·16
3	2·5	3·75	5·0	6·25	7·50	8·75	10·0
$3\frac{1}{4}$	2·7	4·06	5·41	6·77	8·12	9·47	10·83
$3\frac{1}{2}$	2·91	4·37	5·83	7·29	8·75	10·20	11·66
$3\frac{3}{4}$	3·11	4·68	6·25	7·80	9·37	10·93	12·50
4	3·33	5·0	6·66	8·32	10·0	11·66	13·33
$4\frac{1}{4}$	3·53	5·31	7·08	8·85	10·62	12·39	14·16
$4\frac{1}{2}$	3·74	5·62	7·5	9·36	11·25	13·12	15·0
$4\frac{3}{4}$	3·95	5·93	7·91	9·88	11·87	13·85	15·83
5	4·16	6·25	8·32	10·04	12·5	14·58	16·66
$5\frac{1}{4}$	4·37	6·55	8·75	10·92	13·12	15·31	17·49
$5\frac{1}{2}$	4·58	6·86	9·16	11·45	13·75	16·04	18·32
$5\frac{3}{4}$	4·79	7·18	9·58	11·97	14·37	16·77	19·16
6	5·2	7·5	10·0	12·5	15·0	17·5	20·0

(*Penn.*)

SQUARE AND ROUND IRON, WEIGHT PER FOOT.

Size in inches.	Square.		Diameter in inches.	Round.	
	Wrought.	Cast.		Wrought.	Cast.
	lb.	lb.		lb.	lb.
$\frac{1}{4}$	0·208	0·20	$\frac{1}{4}$	0·163	0·15
$\frac{3}{8}$	0·468	0·44	$\frac{3}{8}$	0·368	0·34
$\frac{1}{2}$	0·833	0·78	$\frac{1}{2}$	0·654	0·61
$\frac{5}{8}$	1·30	1·22	$\frac{5}{8}$	1·02	0·95
$\frac{3}{4}$	1·87	1·75	$\frac{3}{4}$	1·47	1·38
$\frac{7}{8}$	2·55	2·39	$\frac{7}{8}$	2·00	1·87
1	3·33	3·12	1	2·61	2·45
$1\frac{1}{8}$	4·21	3·95	$1\frac{1}{8}$	3·31	3·10
$1\frac{1}{4}$	5·20	4·88	$1\frac{1}{4}$	4·09	3·83
$1\frac{3}{8}$	6·30	5·90	$1\frac{3}{8}$	4·94	4·64
$1\frac{1}{2}$	7·50	7·03	$1\frac{1}{2}$	5·89	5·52
$1\frac{5}{8}$	8·80	8·25	$1\frac{5}{8}$	6·91	6·48
$1\frac{3}{4}$	10·20	9·57	$1\frac{3}{4}$	8·01	7·51
$1\frac{7}{8}$	11·71	10·98	$1\frac{7}{8}$	9·20	8·62
2	13·33	12·50	2	10·47	9·81
$2\frac{1}{8}$	15·05	14·11	$2\frac{1}{8}$	11·82	..
$2\frac{1}{4}$	16·87	..	$2\frac{1}{4}$	13·25	..
$2\frac{3}{8}$	18·80	..	$2\frac{3}{8}$	14·76	..
$2\frac{1}{2}$	20·80	..	$2\frac{1}{2}$	16·36	..
$2\frac{5}{8}$	22·96	..	$2\frac{5}{8}$	18·03	..
$2\frac{3}{4}$	25·20	..	$2\frac{3}{4}$	19·79	..
$2\frac{7}{8}$	27·55	..	$2\frac{7}{8}$	21·63	..
3	30·00	..	3	23·56	..
$3\frac{1}{4}$	35·20	..	$3\frac{1}{4}$	27·65	..
$3\frac{1}{2}$	40·80	..	$3\frac{1}{2}$	32·07	..
$3\frac{3}{4}$	46·87	..	$3\frac{3}{4}$	36·81	..
4	53·33	..	4	41·88	..
$4\frac{1}{4}$	60·20	..	$4\frac{1}{4}$	47·28	..
$4\frac{1}{2}$	67·50	..	$4\frac{1}{2}$	53·01	..
$4\frac{3}{4}$	75·20	..	$4\frac{3}{4}$	59·06	..
5	83·33	..	5	65·45	..

TABLE OF THE WEIGHTS PER FOOT RUN, AND SECTIONAL AREAS OF EQUAL-SIDED ANGLE AND TEE IRONS.
The L and T Irons are taken as Uniformly Thick in each Part.

Thickness of section in inches and parts.	Thickness in parts of an inch.																	
	1/4		5/16		3/8		7/16		1/2		9/16		5/8		11/16		3/4	
	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.	lb.	sec. area.
1½	2·31	·69	2·82	·84	3·31	·99	3·77	1·12	4·20	1·26								
1⅝	2·52	·75	3·08	·92	3·62	1·08	4·14	1·20	4·62	1·38								
1¾	2·73	·81	3·35	1·00	3·94	1 18	4·51	1·35	5·04	1·51								
1⅞	2·94	·88	3·61	1·08	4·25	1·27	4·88	1·46	5·46	1·63								
2	3·15	·94	3·88	1·16	4·57	1·37	5·24	1·57	5·88	1·76	6·50	1·94	7·09	2·12	7·65	2·29	8·19	2·45
2¼	3 57	1·06	4·40	1·32	5·20	1·50	5·98	1·76	6·72	2·01	7·44	2·23	8·14	2·44	8·81	2·64	9·45	2·82
2½	3·99	1·19	4·92	1·47	5·83	1·74	6·71	2·00	7·56	2·26	8·39	2·52	9·19	2·75	9·96	2·93	10·71	3·15
2¾	4·41	1·32	5·45	1·63	6·46	1·93	7·45	2·23	8·40	2·51	9·33	2·79	10·24	3·07	11·12	3·33	11·97	3·58
3	4·83	1·44	5·97	1·78	7·09	2·12	8·18	2·44	9·24	2·77	10·28	3·08	11·29	3·38	12·27	3·67	13·23	3·96
3¼	5·25	1·57	6·50	1·94	7·72	2·31	8·92	2·67	10·08	3·02	11·22	3·36	12 34	3·69	13·43	4·02	14·49	4·34
3½	5·67	1·69	7·02	2·10	8·35	2·50	9·65	2·88	10·92	3·28	12·17	3·65	13·39	4·01	14 58	4·36	15·75	4·72
3¾	6·09	1·82	7·55	2·26	8·98	2·69	10·39	3·11	11·76	3·52	13·11	3·92	14·44	4·32	15·74	4·72	17·02	5·11
4	6·51	1·95	8·07	2·41	9·61	2·86	11·12	3·32	12·60	3·77	14·06	4·22	15·49	4·64	16·89	5·06	18·27	5·47
4¼	6·93	2·07	8·60	2·57	10·24	3·07	11·86	3·55	13·44	4·02	15·00	4·49	16·54	4·95	18·05	5·40	19·53	5·82
4½	7·35	2·20	9·12	2·73	10·97	3·25	12 59	3·77	14·28	4·28	15·95	4·78	17·59	5·27	19·20	5·75	20·79	6·22
4¾	7·77	2·33	9·65	2·89	11·50	3·44	13·32	3·98	15·12	4·53	16·89	5·06	18·64	5·58	20·36	6·09	22·05	6·60
5	8·19	2·45	10·17	3·04	12·13	3 63	14·06	4·20	15·96	4·77	17·84	5·34	19·69	5·89	21·51	6·44	23·31	6·98
5¼	8·61	2·58	10·69	3·20	12·76	3·82	14·80	4·43	16·80	5·03	18·78	5·62	20·74	6·21	22·67	6·78	24·57	7·35
5½	9·03	2·70	11·22	3 35	13·39	4·00	15·53	4·65	17·64	5·28	19·73	5·91	21·79	6·52	23·82	7·13	25·83	7·73
5¾	9·45	2·82	11·75	3·52	14 02	4·20	16·27	4·86	18·48	5 53	20·67	6·19	22·84	6·84	24·88	7·48	27·09	8·11
6	9·87	2·92	12·27	3·66	14·65	4·38	17·00	5·09	19·32	5·78	21·62	6·47	23·89	7·15	26·13	7·82	28·36	8·48

The weights are given in pounds and decimal parts; the sectional areas are given in inches and decimal parts.

(*Penn.*)

WEIGHT OF CAST-IRON PIPES, 12 INCHES LONG, FROM ¼″ TO 1¼′ THICK.

Diam. of bore.	¼	⅜	½	⅝	¾	⅞	1″	1⅛	1¼
1	3·06	5·06	7·36	9·97	12·89	16·11	19·63		
1¼	3·68	5·98	8·59	11·51	14·73	18·25	22·09		
1½	4·29	6·9	9·82	13·04	16·56	20·4	24·54	28·99	33·74
1¾	4·91	7·83	11·05	14·57	18·41	22·55	27·0	31·75	36·76
2	5·53	8·75	12·27	16·11	20·25	24·7	29·45	34·46	39·89
2¼	6·14	9·66	13·5	17·64	22·09	26·84	31·85	37·28	42·95
2½	6·74	10·58	14·72	19·17	23·92	28·93	34·36	40·03	46·02
2¾	7·36	11·5	15·95	20·7	25·71	31·14	36·81	42·8	49·08
3	7·98	12·43	17·18	22·19	27·62	33·29	39·28	45·56	52·16
3½	9·2	14·21	19·64	25·31	31·3	37·58	44·18	51·08	58·29
4	10·44	16·11	22·1	28·38	34·98	41·88	49·09	56·61	64·43
4½	11·66	17·94	24·54	31·44	38·65	46·17	53·99	62·12	70·56
5	12·88	19·78	26·99	34·51	42·33	50·46	58·9	67·94	76·69
5½	14·11	21·63	29·45	37·58	46·02	54·76	63·81	73·17	82·84
6	15·34	23·47	31·91	40·65	49·7	59·06	68·73	78·7	88·75
7	17·79	27·15	36·82	46·79	56·84	67·65	78·53	89·74	101·24
8	20·02	30·83	41·71	52·92	64·42	76·23	88·35	100·78	113·51
9	22·71	34·52	46·64	59·07	71·8	84·84	98·18	111·84	125·8
10	25·6	38·2	51·54	65·2	79·16	93·42	108	122·87	138·06
11	27·62	41·88	56·46	71·33	86·52	102·01	117·81	133·92	150·33
12	30·06	45·55	61·35	77·46	93·6	110·6	127·6	144·96	162·6

CORRUGATED IRON ROOFING.

B. W. Gauge.	Size of Sheets.	Weight per Square.
16	6 ft. × 2 ft. to 8 ft. × 3 ft.	3⅛ cwts.
18	,, ,,	2¼ ,,
20	,, ,,	1¾ ,,
22	,, ,,	1½ ,,
24	,, ,,	1¼ ,,
26	,, ,,	1 ,,

Water—

1 gallon weighs about 10 lb.
1 cubic foot contains $6\frac{1}{8}$ gallons.

TABLE SHOWING CONTENTS OF CISTERNS OF VARIOUS SIZES.

Contents.	Length.	Breadth.	Depth.
30 gallons.	2 feet 0 in.	1 foot 6 in.	1 foot 8 in.
40 ,,	2 ,, 7 ,,	1 ,, 6 ,,	1 ,, 8 ,,
50 ,,	2 ,, 7 ,,	1 ,, 7 ,,	2 ,, 0 ,,
60 ,,	2 ,, 7 ,,	1 ,, 9 ,,	2 ,, 2 ,,
70 ,,	2 ,, 10 ,,	1 ,, 10 ,,	2 ,, 2 ,,
80 ,,	3 ,, 0 ,,	2 ,, 0 ,,	2 ,, 2 ,,
90 ,,	3 ,, 0 ,,	2 ,, 0 ,,	2 ,, $5\frac{1}{2}$,,
100 ,,	3 ,, 0 ,,	2 ,, 2 ,,	2 ,, 6 ,,
110 ,,	3 ,, 3 ,,	2 ,, 3 ,,	2 ,, 6 ,,
120 ,,	3 ,, 3 ,,	2 ,, 4 ,,	2 ,, 7 ,,
130 ,,	3 ,, 4 ,,	2 ,, 4 ,,	2 ,, 9 ,,
140 ,,	3 ,, 7 ,,	2 ,, 4 ,,	2 ,, 9 ,,
150 ,,	3 ,, 7 ,,	2 ,, 5 ,,	2 ,, 10 ,,

PLASTERER.

1 cask Portland or Parian cement contains 4 bushels.
1 cask Roman cement contains 5 bushels.
1 sack Portland cement contains 2 bushels.
1 sack Roman cement contains 3 bushels.
1 bag plaster of Paris contains 14 lb.
1 sack plaster of Paris contains 2 cwt.
1 bag lime contains 2150 cub. inches.

1 bundle laths contains 500 feet run.
Single fir laths are $\frac{3}{16}$″ thick.
Lath and half, $\frac{1}{4}$″ thick.
Double laths, $\frac{3}{8}$″.

$1\frac{1}{4}$ yard lime
$2\frac{1}{2}$ yards sand
15 lb. hair
} will cover 100 yards *rendering* only.

$2\frac{1}{4}$ yard lime
$2\frac{1}{2}$ yard sand
18 lb. hair
} will cover 100 yards *render and set.*

$2\frac{1}{2}$ yards lime
$3\frac{1}{4}$ yards sand
21 lb. hair
} will cover 100 yards *render flat and set.*

1 bushel cement and 1 bushel sand will cover $4\frac{1}{2}$ yards $\frac{1}{2}$″ thick.
1 bundle laths and 400 nails will cover 5 yards nearly.
2 bushels lime will do 100 yards of limewhiting.

PLUMBER.

Thickness of Lead.

Weight per foot super. in lb.	Thickness in inches.	Weight per foot super. in lb.	Thickness in inches.
4	·068	7	·118
5	·085	8	·135
6	·100	9	·152

Weight of Lead Pipes.

	Light.	Middling.	Strong.
½″ = 15 feet length	15 lb.	17 lb.	22 lb.
¾ „ „	24 „	28 „	32 „
1 „ „	36 „	42 „	50 „
1½ „ „	48 „	56 „	64 „
2 „ „	84 „	96 „	112 „

Weight of Zinc *per foot super.*

Gauge.	Weight.			Gauge.	Weight.		
	lb.	oz.	drms.		lb.	oz.	drms.
6	—	7	10	13	1	3	9
7	—	8	12	14	1	5	12
8	—	9	13	15	1	7	14
9	—	10	14	16	1	10	1
10	—	13	1	17	1	14	6
11	—	15	4	18	2	2	11
12	1	1	6				

PAINTER.

5 lb. white lead
5 lb. putty
1 quart oil
} will cover 45 yards of first coat.

5 lb. white lead
1 quart oil
} will cover 45 yards each succeeding coat.

GLAZIER.

1 crate of crown glass contains—
12 tables of the best.
15 „ seconds.
18 „ thirds.
18 „ fourths.

Each table measuring from 48 to 54 inches diameter.

PAPERHANGER.

12 yards lineal = 1 *piece* of paper.
1 dozen border = 12 yards.

Paper is usually 20 inches wide.

To find the number of pieces of paper required to cover a room, divide the superficial area to be covered in feet, by 60 (the number of feet superficial in a piece).

TABLES OF CONSTANTS.

I do not know that I can better conclude a work of this nature than by laying before my readers the annexed "Tables of Constants." I am aware they are very far from perfect, but they are collected from different sources, and I trust will be found of service. In estimating it is often the case that we are at a loss to know the time a certain class of work will take a man to execute. By referring to the Table, we ascertain the number of hours an average skilled artisan may be expected to do it in; but, as different men take different times, varying according to the skill of the workman, it follows that the most carefully computed Tables necessarily suffer in a degree not to be rectified. It is impossible to lay down abstract rules for every item, or indeed every trade, because they vary in nearly every job. I refer particularly to the Plumber, which I have entirely omitted.

The subject of valuing quantities is not the least important with which the surveyor has to do, but it is one that requires a very large amount of experience and knowledge, and one that the student must overcome before he can become competent or qualified as a surveyor.

In the following Tables it will be necessary to multiply the constant by the rate per hour of the workmen (if they are paid at different rates take the average), which will give the price of the labour. To this must be added the cost of the material, and the total will give the estimated prime cost of the work.

EXCAVATOR.

	Labourer.
Excavation only—at per foot cube :—	
Vegetable earth or loam	·6 hours.
Clay or heavy ground	1·0 „
Gravel or hard ground	1·5 „
Digging, Throwing into Barrows, and Wheeling—50 yards :—	
Earth	1·4 „
Gravel, clay, &c.	1·8 „
Filling in and Ramming about Foundations	·5 „
Clay Puddling—tempering and laying	6·0 „

BRICKLAYER.

Concrete.—Labour, mixing, wheeling, and throwing in from a stage—per yard cube	3·35 „
Concrete.—Mixing, wheeling, and spreading, and levelling in layers—9″ thick, at per yard super	1·50 „
Ditto ditto ditto 12″ thick	1·95 „
Ditto ditto ditto 18″ „	2 80 „

	Bricklayer and Labourer.
Brickwork per rod	49·00 hours.
Ditto in walls 1 brick thick	55·00 „
Extra labour to selected facings—per ft. super	·15 „
Axed arches „	·45 „
Gauged arches „	1·50 „
Half-brick walls in cement „	·15 „
Tuck pointing per yard super	2·50 „
Bricknogging laid flat „	·80 „
„ on edge „	·60 „
Brick paving laid flat in sand	·45 „
„ on edge in sand	·70 „
„ laid flat in mortar	·56 „
„ on edge in mortar	·85 „
Paving bricks laid flat in sand	·45 „
„ on edge in sand	1·05 „
„ laid flat in mortar	·75 „
„ on edge in mortar	1·20 „
4 inch drain pipe laid and jointed in cement, including junctions per foot run	·12 „
6 „ „ „ „	·18 „
9 „ „ „ „	·25 „
12 „ „ „ „	·35 „
18 „ „ „ „	·50 „
Pantiling laid dry per square	4·22 „
„ pointed outside „	6·85 „
„ pointed both sides „	7·90 „
Plain tiling laid to a 4″ gauge „	7·40 „
„ „ 3½″ gauge „	7·60 „
„ 3″ gauge „	7·90 „

MASON.

	Mason.
Labour on Portland or similar stone—per foot super	
Sawing	1·25 hours.
Plain work in beds and joints	1·40 „
Sunk work „ „	1·75 „
Plain face, rubbed	1·60 „
Plain face, circular	2·40 „
Sunk work, rubbed	2·00 „
Sunk work, circular	2·60 „
Moulded work	2·55 „
Moulded work, circular	3·82 „
Circular work to shafts of columns	3·25 „
Circular circular work	5·00 „
The labour on Bath stone compared with Portland is about as 4 : 7.	
Labour, squaring, and laying York or Purbeck paving—per foot super	·20 „
Add—If in courses	·10 „
Labour, taking up, squaring, and relaying old paving—per foot super	·45 „
Add—If in courses	·15 „

SLATER.

	Slater and Labourer.
Labour laying— .. .. per square	
Doubles .. .. „	1·70 hours.
Ladies .. .. „	1·50 „
Countesses .. .. „	1·40 „
Duchesses .. .. „	1·20 „

CARPENTER AND JOINER.

	Joiner.
Fir in bond timbers (plates, lintels, and wood bricks)—per foot cube	1·25 hours.
„ framed	1·25 „
„ „ in trusses	1·70 „
„ wrought and framed	2·10 „
„ „ framed, and chamfered	2·50 „
„ „ „ and rebated	2·54 „
„ „ „ rebated, and beaded ..	2·94 „
„ „ „ „ and double beaded	3·36 „
„ proper door cases	3·80 „
Planing fir—per foot super	·14 „
Centering—per foot square.	
For plain cylindrical vaults or arches	15·50 „
„ groined arches	35·00 „
„ trimmer arches—per foot super	·60 „

ROUGH BOARDING—*per square.*

Thickness.	Rough.	Edges Shot.	Ploughed and Tongued.
	hours.	hours.	hours.
¾ inch	5·00	6·66	7·50
1 „	5·40	7·10	9·18
1¼ „	5·84	7·50	10·40
1½ „	6·66	8·62	11·67

FLOORING—*at per square.*

Description.	In Deal Widths.				In Batten Widths.	
	1″	1¼″	1½″	2″	1″	1¼″
	hours.	hours.	hours.	hours.	hours.	hours.
Rough, edges shot	7·65	8·40	9·20	12·10	10·60	12·40
Ditto, wrought, laid folding	11·80	12 55	13·40	16·32	15·00	16·66
Ditto, ditto, straight joint	15·00	15·80	17·20	18·40	16·80	18·56
Ditto, ditto, ditto, splayed heading	—	17·60	20·00	24·20	17·92	21·67
Ditto, ditto, ditto, dowelled	—	31 70	35·00	41·50	—	41·67

Add to each of the foregoing if	Deals.	Battens.
Ploughed and tongued headings	2·95	4·30
Ditto, ditto, edges	5·10	7·50
Tongues to edges of boards	8·40	12·50
If less than 5″ wide	—	3·35

Battening—per square.
¾″ to 1¼″ placed 12″ from centre to centre .. 5·90 hours.
Add—If plugged to walls .. .. 1·70 „

Weather Boarding—per square.
Rough .. .. 4·20 „
„ splayed edges .. .. 6·80 „
Wrought .. .. 10·00 „
„ and beaded .. .. 12·50 „

Gutter Boards and Bearers—per foot super .. .. ·76 „
Inch or 1¼ inch .. .. ·75 „

DEALS IN THICKNESSES—*per foot super.*

Description.	¾″	1″	1¼″	1½″	2″
Rough	·09	·11	·12	·13	·15
Edges shot	·15	·18	·20	·23	·28
Wrought one side and edges	·23	·26	·28	·31	·36
Ditto both sides and edges	·29	·32	·34	·37	·43
Ditto one side and framed	·45	·50	·52	·56	·62
Ditto both sides and framed	·55	·60	·63	·68	·74

Skirtings—per foot super.

Plain skirting	·37	hours.
„ skirting circular	·70	„
„ raking cut to steps	·70	„
Torus skirting	·65	„
„ circular	·90	„
„ raking cut to steps	·85	„
Moulded (common) skirting	·75	„
„ circular	1·05	„
„ raking cut to steps	·95	„

Framed Grounds—per foot super.

Common framed grounds	·63	„
Inch ditto ploughed for plastering	·70	„
1¼ ditto „ „	·76	„
1½ ditto „ „	·83	„

Framed Partitions—per foot super.

1½″ square framed	·65	„
Moulded one side	·15	„
„ both sides	·30	„
2″ square framed	·76	„
2″ moulded one side	·18	„
2″ „ both sides	·36	„

Sashes and Frames, per foot super.

Deal cased frames, oak sunk sill, deal pulley stiles, &c., complete for 1½″ sashes	·70	„
Ditto, ditto, for 2″ sashes	·82	„
Ditto, ditto, for 2½″ sashes	·85	„
Add—If prepared with wainscot or mahogany pulley stiles and slips	·85	„
„ If double hung	·13	„
1½ inch deal ovolo sashes	·49	„
1½ inch wainscot or mahogany ditto	·70	„
2 inch deal ditto	·70	„
2 inch wainscot or mahogany ditto	·98	„
Add—If astragal and hollow in deal	·13	„
„ If astragal and hollow in wainscot or mahogany	·21	„

Curved heads, twice that of straight.
Circular on plan, ditto.

French Casements, per foot super.

1½ inch deal ovolo	·70	hours.
2 and 2½ inch ditto	·80	„
1½ inch wainscot or mahogany	·95	„
2 and 2½ inch ditto	1·15	„
Add—To deal casements if with marginal lights..	·16	„
„ To mahogany ditto ditto	·28	„

Window Linings, per foot super.

Inch deal two-panel square framed back linings	1·00	„
„ bead-butt or moulded	1·12	„
„ bead flush or quirk moulded	1·20	„
Add—For each panel above two, if square	·20	„
„ For each panel if moulded	·26	„
„ If splayed linings	·06	„

Window Backs, Elbows, and Soffits, per foot super.

Inch deal, plain keyed, or two panel square backs	·85	„
Ditto two panel square backs, elbows and soffits	·98	„
Add—For each panel above three	·10	„
„ If bead-butt or moulded	·12	„
„ If bead flush or quirk moulded	·20	„

Boxings to Windows, per foot super.

Deal framed rebated and beaded boxings ..	1·00	„
Splayed ditto ditto	1·20	„

Shutters, per foot super.

¾ inch deal clamped flaps in one height ..	1·20	„
Inch ditto, two panel square framed in one height	1·25	„
Add—For every panel above two—		
If square framed	·20	„
If bead-butt	·20	„
If bead flush	·25	„
If moulded	·25	„
For every extra height	·10	„

Doors, per foot super.

1¼ inch deal ledged door, rough edges shot ..	·65	„
Add—If ploughed and tongued	·12	„
„ „ and beaded	·20	„
„ If wrought one side	·12	„
„ „ both sides	·24	„
„ If braced	·26	„
„ If hung folding	·20	„
Two-panel square framed	·70	„
Add—For every additional two panels—		
If square framed, 1½″ deal	·19	„
„ „ „ 2″ deal	·21	„
„ „ „ 2½″ deal	·27	„
„ If bead-butt and square, 1½″	·20	„
„ „ 2″	·24	„
„ „ 2½″	·26	„

Add—If bead flush and square, $1\frac{1}{2}''$	·26	hours.
„ „ $2''$	·36	„
„ „ $2\frac{1}{2}''$	·42	„
„ If moulded, $1\frac{1}{2}''$	·20	„
„ $2''$	·24	„
„ $2\frac{1}{2}''$	·26	„
„ If double margins	·25	„
„ If hung folding	·15	„
Door Linings, per foot super.		
Plain, single rebated	·55	„
Ditto, ditto, and beaded	·63	„
Ditto, double rebated	·70	„
Ditto, ditto, and double beaded	·75	„
Square framed jambs, each in two panels, and soffit	1·00	„
Add—If bead-butt	·13	„
„ If bead flush	·26	„
„ If raised panel and moulded	·42	„
„ For every extra panel if square	·20	„
„ Ditto flush or moulded	·26	„
„ If double rebated	·20	„
„ If double beaded	·13	„
Staircases, per foot super.	Joiner.	
Treads and risers and fir carriages	·70	hours.
Ditto, moulded nosings and close strings ..	·98	„
Ditto, ditto, mitred and returned	1·25	„
Add—If winders circular at one end	·40	„
„ Ditto, two ends	·80	„
„ Ditto, geometrical, with wrought and blocked carriages	·56	„
„ Ditto, feather-tongued joints	·21	„
Quarter curtail, glued upright	6·66	„
Ditto, blocked and veneered	11·66	„
Proper curtail step and riser	33·34	„
Returned moulded nosing	2·50	„
Ditto, circular	4·17	„
Plain cut bracket	2·50	„
Plain circular	4·17	„
Housing to step and riser	·98	„
„ to winders	1·25	„
„ to moulded nosings	1·67	„
„ to moulded circular ends	4·59	„
Wall Strings—per foot super.		
Plain and plugging	·80	„
Moulded	1·00	„
Outer Strings—per foot super.		
$1\frac{1}{4}$ deal plain	·84	„
„ sunk	·98	„
„ moulded	1·12	„
„ cut for steps and risers	1·27	„
„ mitred to risers	1·40	„
If ramped, once and a half of straight.		
If wreathed, four times of straight.		

Handrails—per foot run.

Plain 3″ × 3″	·60	hours.
Moulded .. .. from	·85	„
Add for ramps .. .. „	·55	„
„ wreaths .. .. „	12·00	„
Labour on mahogany handrails = twice that of deal.		

Bar Balusters—per foot run.

1¼″ × 1¼″	·08	„
„ dovetailed	·06	„
Dovetails in steps for balusters—each	1·70	„
Iron balusters—fixing .. .. „	·70	„

Dados—per foot super.

Proper dado, with dovetailed keys, joints secured with slips, &c. &c.	·70	„
Add—If raking, scribed to steps	·19	„
If to moulded nosings	·20	„
If base grooved into floor	·09	„
If circular on plan, twice the straight.		

Pilasters and Columns—per foot super.

1¼″ deal plain pilasters, glued and blocked ..	1·12	„
„ diminished shaft	1·53	„
1¼ „ „ columns, glued and blocked	4·00	„
Add—If arris or fluting to pilasters—1″ wide ..	·20	„
„ „ „ 2″ „ ..	·25	„
„ „ „ 3″ „ ..	·40	„
If to columns .. .. 1″ „ ..	·25	„
„ .. .. 2″ „ ..	·35	„
„ .. .. 3″ „ ..	·50	„

PLASTERER.

	Plasterer, Labourer and boy.	
Rendering—per yard super.	·19	hours.
„ curved	·25	„
„ and setting	·32	„
„ „ curved	·38	„
„ floating and setting	·55	„
„ „ „ curved	·62	„
Lathing	·19	„
„ curved	·28	„
Rendering with cement and sand	·85	„
„ „ „ „ curved ..	1·10	„
Rough casting with lime and gravel	·16	„
„ „ „ „ curved ..	·32	„
Mouldings and cornices, in plaster—per foot super	·42	„
Limewhiting, colouring, ditto—per yard super	·05	„

PAINTER.

Painting in common colours.

First coat, including knotting, stopping, &c.—at per yard super	·27	hours.
Second and each succeeding coat	·14	„

INDEX.

Abbreviations, 131
Abstracting bricklayers' work, order of, 19
„ description of, 5, 122, 123
„ excavators' work, 11
„ usual method of, 122, 123
Accuracy and energy necessary for students, 5
Acquaintance with rules of mensuration, 5
Addition made to provide against discrepancies, 4
„ for scarfing of timbers, 51
„ of extras, how measured, 6
„ to facings for reveals, how measured, 15, 16
Air bricks, building in, „ 21
„ „ 95
Allowance for cutting away for gas, „ 96
„ for old bricks in reparation, „ 126
„ for panels in measuring painting, 115
„ for shrinkage of timber, 51
Allowances for hips and valleys in slating, 23
„ in measurement of tiling, 21, 22
„ margin for, how given, 5
Alterations, difficulty of measuring, 125
„ „ „ instances of, 125, 126
Angle chimneys, how measured, 15
„ „ example of measurement of, 15
„ stones to York copings, &c., how measured, 35
„ staves, how measured, 59
Angles to gutters, how measured, 95
„ to cement work, „ 105
„ to linings, „ 88
„ to mouldings, &c., „ 21
„ to plaster cornice, „ 102
„ to skirtings, „ 65
Apparatus, W. C., „ 109
„ reparation of, „ 128
Aprons, lead, „ 108
„ reparation of, „ 128
Arches and vaulting, „ 16, 20
„ axed, „ 10, 20
„ concrete over, „ 10
„ deductions for, in facing, „ 16
„ groined, „ 17
„ gauged, „ 16, 20
„ relieving, how charged, 17, 21
„ rubble, allowance for, 29, 30
„ segmental, cutting to, how measured, 17, 20

Arches, spandrels of, how measured, 10
„ trimmer in cement, „ 18, 20
Arch stone, example of measurement of, 44
Architect's offer to measure up refused, 4
Architraves, deal, how measured, 69, 75, 88
„ painting of, „ 114, 115
„ plaster, „ 99, 103
Area gratings, „ 94
Arris guttering, „ 58
Arrises cement, „ 104
Art of building, thorough knowledge of requisite, 5
Ash-holes, deductions for, how measured, 15
Ashlar work, 30, 36
„ reparation of, 128
Attending on other trades, where mentioned, 124
Axed arches, how measured, 16, 20

Back flaps, how measured, 70, 115
„ hinges, „ 89
„ linings, „ 70
Backings to dado, „ 75
„ to windows, „ 87
„ joints to York steps, „ 35
Backs to windows, „ 87
Balcony, painting of, „ 114
Ball-cocks, „ 109, 110
Balusters, „ 99
„ painting of, „ 115, 117
„ turned, „ 82, 89
Barge boards, „ 62
Barrel bolts, „ 89
„ drains, „ 19
Bars, iron, reparation of, „ 129
Bath stone, „ 36
Batten boarding, „ 87
Battening „ „ 55, 61
„ flooring, „ 64, 85
Beads and quirks in cement and plaster, how measured, 21, 102, 104
„ gilding of, how measured, 118
„ in plaster, „ 99
„ reparation of, „ 127
Beams, iron, reparation of, „ 129
Bearers to W.C., „ 83
Bedding and pointing frames, „ 21
Beds and joints to stonework, „ 37, 41
Bellhanger, „ 96
Bellhangers' work, table of, „ 97
Bells, „ 97
Bell traps, „ 110
Bends and elbows in soil pipes, „ 110
Bent glass, „ 119, 120
Bib-cocks, „ 109, 110
Billing, description of, „ 5, 123

Billing, order of measurements, 11
Bills of quantities, operations necessary to produce, 5
Bird's-mouth cuttings, how measured, 16, 20
Block-stone, 30
Boarding, how measured, 55, 57, 62
„ reparation of, how measured, 127
„ rough, „ 57, 62
„ to spandrel, „ 87
„ V-jointed, „ 87
Bolts, barrel, how measured, 89
„ brass, „ 89
„ iron, „ 93
„ necked, „ 89
Bond, hoop-iron, „ 18
„ timber, „ 52, 53
Border to slabs, „ 64, 85
Borders to paper, „ 121
Bosses, gilding of, „ 118
Boundary walls, „ 12, 20
Boxing shutters, „ 70
„ painting of, how measured, 115
Box, paper, how measured, 89
Bracketing, „ 59, 62
Brackets, cast-iron, „ 96
„ painting of, „ 117
„ to stairs, „ 80, 88
Brass bolts, „ 89
„ gratings, „ 109
„ knob turn-buckles, „ 90
„ sash fasteners, „ 90
„ thumbscrews, „ 90
„ quadrant regulator, „ 90
Brasswork to lavatories, „ 110, 111
„ to lead pipes, „ 109, 110
Brick coping, reparation of, „ 126
Bricklayer, 12–20
Bricklayers' work, how measured, 126
„ abstracting, 19
„ abbreviations or terms used in, 132
Brick lining to stone, how measured, 30
„ nogging, „ 18, 20
„ on edge coping, „ 18, 21
„ paving, „ 18, 20
Bricks, allowance for old, in reparation, 126
Brickwork, circular, how measured, 17, 20
„ „ under 20 ft. diameter, 17
„ example of reducing, 19
„ facing to, how measured, 15, 20
„ how valued, 12
„ in cement, how measured, 17, 20
„ pointing of, reparation of, 126
„ standard thickness of, 19
British plate glass, how measured, 120

Bronze bell-pulls, how measured, 97
Builders acquainted with quantities have advantage, 4
„ estimates, from what part of quantities made, 5
„ measure more fully, 3
„ prices, why erratic, 4
„ what part of quantities supplied to them, 5
Building, art of, knowledge required, 5
„ in ventilators and air bricks, 21
„ measuring from, 5
„ rectangular, how measured, 12
„ stones, 36
„ trades, 5
Bull-nosed step, how measured, 79
Burning in flashings, „ 109
Butts, how measured, 89

Call-bells, how measured, 97
Canvas, „ 129
Capping, wrought, „ 88
Caps to columns, „ 41
„ to newels, „ 89
„ to plaster column, „ 99, 104
Carpenter, 50–62
Carpenters' and joiners' work, distinction between, 50, 63
„ work, abbreviations of terms used in, 132
„ „ labour on, 60
„ „ order of taking, 52
„ „ table of, 61
„ „ table of reparations of, 126, 127
Carriages to stairs, how measured, 79
Carting away of soil, „ 126
Carved boss, „ 41
„ caps, gilding of, „ 118
„ work, painting of, „ 116
„ „ gilding of, „ 118
Carving to caps of wood columns, how measured, 76
„ to stone, how measured, 39, 41
Cased frames, „ 66, 86
„ example of measurement of, 66
Casements and frames, painting of, how measured, 114, 117
„ French, how measured, 67
Casings, how measured, 87
„ for revolving shutters, how measured, 78
Cast iron, how measured, 95
Cathedral glass, „ 120
Caulking holes in stone, „ 40
Ceiling, example of measurement of, 100
„ joists, how measured, 57
„ ribs, „ 62
Cement angles, „ 102
„ arrises, „ 104
„ brickwork in, how measured, 17
„ caps, reparation of, „ 128

Cement sills, how measured, 128
„ copings, „ 128
„ cornices, „ 128
„ dressing, „ 128
„ filleting, „ 21, 22, 24
„ floors, „ 103, 105
„ hearths, „ 103, 105
„ painting, „ 116
„ plinths, reparation of, how measured, 128
„ rendering, how measured, 18
„ reveals, „ 128
„ „ painting of, „ 117
„ skirtings, „ 103
„ work, „ 103
„ „ reparation of, „ 128
Centering, how measured, 17, 60, 61
„ for barrel drains, when taken, 19
„ trimmers, when measured, 14
Centre flowers, how measured, 101, 105
Cesspools, „ 19
„ digging to, how measured, 11
„ emptying of, „ 126
„ in flats, „ 108, 110
„ price, where increased, 10
„ to gutters, how measured, 56
Chair-rail, painting of, „ 116
Chamfers, off brickwork, „ 21
„ off stone, „ 38
„ labour to, „ 62
„ stops to, „ 21
Channels, stone reparation of, how measured, 127
Cheeks, reparation of, 128
Chimney angle, how measured, 15
„ „ example of measurement of, 15
„ bars, how measured, 15, 57, 94
„ breasts, „ 14
„ pieces, painting of, how measured, 117
„ „ reparation of, „ 126
„ „ setting of, „ 21
„ „ slate, „ 25
„ „ stone, „ 38
„ pots, cement, „ 99
„ „ reparation of, „ 126
„ „ setting of, „ 21
Chimneys, reparation of, „ 126
Church windows, glazing, „ 120
„ example of measurement of, 120
Circular brickwork, how measured, 17
„ „ under 20 ft. diameter, how measured, 17
„ cement work, how measured, 103
„ circular work to stone, how measured, 32
„ „ to sashes and frames, „ 67, 86
„ corners to panelling, „ 88

Circular corners to partitions, how measured, 76
„ cutting to York paving, „ 34
„ fair cutting, „ 20
„ heads to cased frames, „ 67, 86
„ „ to French casements, „ 67
„ iron columns, „ 93
„ moulded work to stone, „ 32
„ plasterers' work, how measured, 102
„ sashes and frames, „ 67, 86
„ slating, „ 23, 25
„ sunk work, „ 31
„ work, measurement of, 14
„ „ to dado, how measured, 75
„ „ to plaster columns, „ 99
„ „ to stone, how measured, 38, 41
Cistern heads, reparation of, „ 129
Cisterns, lead work to, „ 109
„ reparation of, „ 128
„ slate, how measured, 24, 25
„ „ how specified, 25
„ wrought and dovetailed, how measured, 87
Clay puddling, how measured, 11
Cleats, fir, „ 54, 62
Clips to down-pipes, painting of, how measured, 114
Close joint to old floor, „ 85
Closet fittings, how measured, 82
Coal plates, „ 94
Cocks, bib and stop, „ 109, 110
Collars, „ 54
Collection of work desirable in quantities, how measured, 6
Coloured glass, how measured, 119
Colouring, „ 103, 105
Columns glued up, how measured, 86
„ iron, „ 93
„ „ reparation of, how measured, 129
„ plaster, „ 99
Commencement of measuring, where, 8
Common colours, what they are, 116
Concrete, excavation for, how measured, 9
„ in foundation, „ 10, 11
„ over arches, „ 10
„ pavings „ 10
Conditions of contract, 124
Constants, table of, 152–159
Contract, conditions of, how measured, 124
Contrast between English and Scotch measurement of stone (table), 48–49
Coping, brick-on-edge, how measured, 18
Coping and curbs, York, how measured, 34, 40
„ brick, reparation of, „ 126
„ painting of, „ 114, 117
„ stone, how measured, 28
„ „ reparation, „ 128
Copper nailing, „ 110

Copper wire, how measured, 97
Coppers, doors to, „ 95
„ setting of, „ 15
„ wrought iron, „ 94
Corbels, York, „ 40
Coring, how measured, 14
Cornices, deal, „ 88
„ example of measurement of, 101
„ in brickwork, how measured, 21
„ painting of, „ 114
„ plaster, „ 99, 104
„ reparation of, „ 128
„ stone, example of measuring, 45
Cradling, how measured, 59
Cramps and plugs to York stone, how measured, 35
„ reparation of, how measured, 127
Cranks for bells, „ 97
Creasing, slate, how taken, 24, 25
„ tile, how measured, 18
„ „ reparation of, „ 126
Cresting iron, how measured, 94
„ „ painting of, „ 114, 117
„ slate, „ 24, 25
„ „ how set, 24
Cross garnet hinges, how measured, 89
Cube stone, price of, labour included in, 4
Cubes, order of, in billing, 11
Cupboard front, how measured, 77, 87
Curbs and coping, York stone, how measured, 34, 40
„ fir, how measured, 54, 61
„ oak, „ 59
„ stone, „ 127
„ to wells „ 10
Curtail end to step, how measured, 79, 88
Customary method of commencing measurement, 8
„ of measuring stone, 36
Cutting and waste to hip and valley pieces, how measured, 54
„ and pinning to York shelves, „ 34, 40
„ and pinning to York steps, „ 35, 40
„ and pinning slate into walls, how taken, 24
Cutting away for bellhanger, how measured, 96, 97
„ for gas-piping, „ 96
„ for revolving shutters, „ 78
Cutting, circular, how measured, 33, 40
„ glass to segmental heads, how measured, 119, 120
„ irregular-shaped stone, „ 31
„ „ example of, 31
„ over 6 ft. wide, how measured, 20
„ to bird's-mouth, „ 20
„ to linings, „ 87
„ to rough boarding, „ 57
„ to York paving, how taken, 33, 40
Cuttings, how measured, 16, 17

Cuttings, example of measuring, 17
„ to groined arches, how measured, 29
„ to rafters, how measured, 54
„ to slating, „ 23, 25
„ to tiling, allowances for, 22

Dado, how measured, 75, 86
„ painting of, „ 115
Damp course, slate „ 18, 20, 24
Daywork, what generally charged as, 129
Dead locks, how measured, 89
Deal boxing grounds, „ 86
„ cased frames, „ 86
„ cornices, „ 88
„ flaps, „ 83, 86
„ flooring, „ 85
„ framed panels, „ 88
„ „ doors, „ 73, 86
„ „ and braced doors, „ 72, 87
„ „ panelled door, „ 72, 86
„ „ sash, „ 71, 86
„ grounds, „ 86
„ in thicknesses, „ 87, 88
„ ledged doors, „ 71, 86
„ mouldings, „ 88
„ sashes and frames, „ 86
„ shutters, „ 86
„ skirting, „ 85
„ wrought dado „ 86
Deduction of per centage off quantities, 4
Deductions from bricklayers' work, 14
„ from flooring, 52
„ from plasterers' work, 98, 100, 102, 103
„ from roofing, 55
„ from bricknogging, 18
„ from paperhangers' work, 75
„ rubble work, 29, 30
„ slating, 23
„ of omissions, how measured, 6
Definitions of stonework, 31
Description of abstracting, 5
„ of billing, 5
„ of circular work to stone, 32
„ of extras, 6
„ of masons' work, 31
„ of measuring book, 6
„ of measurement of wells, 10
„ of measurement of York stone, 32, 33
„ of measurement of wrought stone, 30
„ of moulded work to stone, 32
„ of omissions, 6
„ of piling, 10
„ of plain work to stone, 31

Description of planking and strutting, 9
„ of plasterers' work, 98
„ of position of work necessary, 6
„ of scabbling to stone, 29
„ of soil necessary, 9
„ of spherical work to stone, 32
„ of steining to wells, 11
„ of sunk work to stone, 31
„ of table of excavators' work, 11
„ of waste, 6
„ of work on building stone, 36–39
„ of work on York stone, 32–35
Design and taste, 2
Difference between measurement of lead and zinc work, 111
„ of opinion as to measuring masons' work, 27
„ of surveyors' quantities, 4
Difficulty of estimating plumbers' work, 106
Digging, how measured, 11
Dimensions for tiling, how taken, 21
„ how entered, 6
„ how readily to find, 6
„ how taken off, 6
„ how to find easily, 6
„ of deductions and additions, 13
„ of same character, how collected, 6
„ of stonework, how student to find, 36
„ of stonework, method of measuring, 36, 37
„ some surveyors keep the same for several trades, 12
„ specimen of ruling of paper for, 7
„ when cast up, 6
Discrepancy, how improperly provided for, 4
Distempering, how measured, 103, 105
Distinction between carpenters' and joiners' work, 50
Door sills, how measured, 127
„ frames, „ 73, 127
„ „ example of measurement of, 72
„ „ pointing to, reparation of, how measured, 126
„ „ reparation of, „ 127
„ furniture, „ 90
„ knobs, „ 89
„ „ and knockers, reparation of, „ 114
„ panels, reparation of, „ 127
„ scrapers, painting of, „ 114, 117
Doors, „ 70–72, 86, 87
„ and linings, painting of, „ 115
„ example of measurement of, 72
„ grounds to, framed, how measured, 74
„ jamb linings to, how measured, 74
Dormer cheeks and covering, lead for, „ 108
Dormers, reparation of, „ 127
Dormer tops, flashing to, „ 128
Double-framed floors, „ 52
Down-pipes, iron, „ 94

Down-pipes, painting of, how measured, 114
„ reparation of, „ 128, 129
„ zinc, „ 111, 112
Dragging pieces, „ 54
Drain pipes, glazed stoneware, „ 21
„ making good to cesspools „ 19
Drains, „ 18, 21
„ barrel, „ 19
„ bends and junctions, „ 19, 21
„ trenches for, „ 9
„ reparation of, „ 126
Drawings, incorrect, offer of architect to measure up, refused, 4
„ measuring from, more care required, 5
„ working, difficulty of measuring from, for students, 5
Dresser, deal, how measured, 83, 89
„ painting of, „ 117
Dressings, cement, reparation of, „ 128
Drips in lead gutters, „ 62, 108
D traps, „ 110, 111

Ears to down-pipes, painting of, how measured, 114, 117
„ to down-pipes, zinc, how measured, 112
Eaves, allowance for tiling, „ 21, 22
„ boarding, „ 55, 62
„ example to show how measured, 23
„ gutter iron, how measured, 95
„ „ zinc, „ 111
„ „ painting of, „ 114, 117
Economizing stone in cutting irregular shapes, 31
Edges of slate paving, how measured, 25
„ of slate shelves, „ 24
Elaborate measurement, result of, 28
Elastic valve closet, how measured, 111
Elbows and bends to soil pipes, how measured, 110
„ to windows, moulded, „ 69, 87
„ to windows, painting of, „ 115
„ to zinc speaking tubes, „ 112
Electric bells, how measured, 97
Embossed glass, „ 119
Enamelling on slate, „ 25
Ends of eaves gutter, painting of, how measured, 117
„ of steps cut and pinned, „ 40
„ of York risers, how measured, 35, 40
„ to lead rolls, „ 108, 110
„ to window boards, „ 87
„ to zinc gutters, „ 112
Energy and accuracy necessary for students, 5
English measurement of stone contrasted with Scotch (table), 48, 49
Enriched strings in cement, how measured, 104
Enrichment coloured, how measured, 105
„ to friezes, „ 102
Enrichments to cornice, „ 99, 104
„ to cornice, reparation of, how measured, 128

Enrichments to stonework, how measured, 42
Estimating plumbers' work, difficulty of, 106
Example of collecting similar items into waste, 6
„ of finding weight of leadwork, 109
„ of measuring book, 6, 7
„ of measurement of angle fire-place, 14
„ „ of arch and skewback, 17
„ „ of arch stone, 44
„ „ of cased frames, 66
„ „ of circular work, 14
„ „ of ceiling, 100
„ „ of coping and curbs, 34
„ „ of cornices, 101
„ „ of cornices, stone, 45
„ „ of curbs and copings, 34
„ „ of cutting irregular-shaped stone, 31
„ „ of cuttings, 17
„ „ of door frames, 73
„ „ of doors, 72
„ „ of eaves of slate, 23
„ „ of flitched girder, 53
„ „ of footings, 13
„ „ of framed grounds, 68, 74
„ „ of framed spandrel to stairs, 77
„ „ of girder riveted, 92
„ „ of glazing to tracery, 120
„ „ of gutter, 56
„ „ of irregular-shaped stone, 31
„ „ of lath and plaster, 100
„ „ of lead flats, 108
„ „ of riveted girder, 92
„ „ of staircase, 78, 80
„ „ of stone cornice, 45
„ „ of stone heads to windows, 45
„ „ of stone spandrel steps, 42
„ „ of stone window sill, 43
„ „ of window back, 69
„ „ of window openings, 14
„ „ of quantities, being in excess, 4
„ of reducing brickwork to standard, 19, 20
Examples of difficulty of measurement of alterations, 125, 126
„ "waste," 6
Excavators' work, abstracting, 11
„ method of measurement of, 9, 10
„ table of, 11
„ trenches, 11
Excess of quantities, how met by builders, 4
External mitres, how measured, 41
„ plasterers' work, „ 98, 99
Extra for bends and junctions in drains, how measured, 19, 21
„ for brickwork in cement, how measured, 17, 20
„ for flatting, how measured, 117
„ for graining, „ 117

Extra for rubble-stone arches, how measured, 29, 30
„ for rubble-stone, openings in, „ 30
Extras, description of, 6
„ how measured, 6

Facing to stonework, how measured, 38
Facings, how measured, 15, 20
„ deductions from, how measured, 16
„ „ for arches, how measured, 16, 20
Fair cutting, how measured, 16, 20
„ ends to York steps, how measured, 35, 40
„ sinkings, how measured, 41
Fancy slating, „ 24
Fascias „ 103
„ cement, „ 103
„ to staircase, „ 88
Fastenings to sashes, how measured, 66
Feather-edged coping, „ 40
„ springers, „ 53
Fence walls, „ 20
Filletings, lime and hair or cement, how measured, 21, 22, 24
„ reparation of, how measured, 126
„ wrought „ 88
Fillets to fir girders, „ 62
„ for sound boarding, „ 58
„ tilting, „ 55
Finials, how measured, 95
„ leadwork to, „ 109
„ painting of, „ 114, 117
Firebricks, how charged, 15
Fir framed in partitions, how measured, 58, 74
„ framed on trusses, „ 54
„ labour to, how measured, 57, 62
Firring for flats, „ 62
Fixed sashes, „ 67
Fixing of slate, „ 25
„ screws and bolts to trusses, how measured, 62
Flaps, folding, how measured, 87
„ to W. C., „ 83, 89
Flashings, lead, „ 107, 108, 109
„ pointing to, how measured, 21
„ reparation of, „ 128
Flats, boarding to, „ 57
„ „ reparation of, how measured, 127
„ cesspools in, how measured, 108, 111
„ firring to, „ 57, 62
„ forming gutters in, „ 57
„ lead, how measured, 107, 110
„ reparation of, „ 127
„ zinc, „ 112
Flatting coat, „ 116, 117
Flexible tube, „ 112
Flitched girder, „ 53, 61

Flitches girder, example of measurement of, 53
Flitches, how measured, 91
Float and set, „ 102, 104, 128
Flooring, „ 64, 52
Floors, cement, „ 103
„ framing in, how measured, 61
„ irregular-shaped, „ 65
Floriated moulded plaster strings, how measured, 99, 104
Flues, how measured, 14, 21
Fluted glass, „ 120
Flutings to plaster columns, &c., how measured, 99, 104
Footings, example of measurement of, 13
Foundations, how measured, 9, 10, 11
„ commence with, 12
Founder and smith, 91–95
Frame, cased, example of measuring, 66
Framed angles to ribs, how measured, 62
„ bearers to gutters, „ 56
„ bracketing, „ 59
„ door grounds, example of measurement of, 74
„ flooring, how measured, 51
„ grounds, „ 68, 87
„ „ example of measuring, 68
„ gutter bearers, how measured, 56
„ partitions, „ 58, 74
„ roofs, how measured, 61
„ spandrel to stairs, example of measuring, 77
„ timber, how measured, 51
„ trusses, „ 54
Frames and sashes, „ 66, 86
„ „ painting of, how measured, 114, 117
„ bedding and pointing to, „ 21
„ door, example of measuring, 73
„ pointing to, reparation of, how measured, 126
„ reparation of, how measured, 127
French casements, „ 67
Friezes, plaster, „ 102
Furnace bars, „ 94

Gas company, fees to, 96
Gaseliers, 95
Gasfitter, 95
Gates, iron, how measured, 94
„ „ reparation of, how measured, 129
„ painting of, „ 114, 116
Gauged arches, how measured, 16, 20
Gilders' work, table of, 118
Gilt lettering, how measured, 117
Girder, flitched, example of measurement of, 53
Girders, cast-iron, how measured, 95
„ flitched, „ 91
„ oak trusses to, „ 53
„ riveted, „ 92

Extra for rubble-stone arches, how measured, 29, 30
„ for rubble-stone, openings in, „ 30
Extras, description of, 6
„ how measured, 6

Facing to stonework, how measured, 38
Facings, how measured, 15, 20
„ deductions from, how measured, 16
„ „ for arches, how measured, 16, 20
Fair cutting, how measured, 16, 20
„ ends to York steps, how measured, 35, 40
„ sinkings, how measured, 41
Fancy slating, „ 24
Fascias „ 103
„ cement, „ 103
„ to staircase, „ 88
Fastenings to sashes, how measured, 66
Feather-edged coping, „ 40
„ springers, „ 53
Fence walls, „ 20
Filletings, lime and hair or cement, how measured, 21, 22, 24
„ reparation of, how measured, 126
„ wrought „ 88
Fillets to fir girders, „ 62
„ for sound boarding, „ 58
„ tilting, „ 55
Finials, how measured, 95
„ leadwork to, „ 109
„ painting of, „ 114, 117
Firebricks, how charged, 15
Fir framed in partitions, how measured, 58, 74
„ framed on trusses, „ 54
„ labour to, how measured, 57, 62
Firring for flats, „ 62
Fixed sashes, „ 67
Fixing of slate, „ 25
„ screws and bolts to trusses, how measured, 62
Flaps, folding, how measured, 87
„ to W. C., „ 83, 89
Flashings, lead, „ 107, 108, 109
„ pointing to, how measured, 21
„ reparation of, „ 128
Flats, boarding to, „ 57
„ „ reparation of, how measured, 127
„ cesspools in, how measured, 108, 111
„ firring to, „ 57, 62
„ forming gutters in, „ 57
„ lead, how measured, 107, 110
„ reparation of, „ 127
„ zinc, „ 112
Flatting coat, „ 116, 117
Flexible tube, „ 112
Flitched girder, „ 53, 61

Flitches girder, example of measurement of, 53
Flitches, how measured, 91
Float and set, „ 102, 104, 128
Flooring, „ 64, 52
Floors, cement, „ 103
„ framing in, how measured, 61
„ irregular-shaped, „ 65
Floriated moulded plaster strings, how measured, 99, 104
Flues, how measured, 14, 21
Fluted glass, „ 120
Flutings to plaster columns, &c., how measured, 99, 104
Footings, example of measurement of, 13
Foundations, how measured, 9, 10, 11
„ commence with, 12
Founder and smith, 91–95
Frame, cased, example of measuring, 66
Framed angles to ribs, how measured, 62
„ bearers to gutters, „ 56
„ bracketing, „ 59
„ door grounds, example of measurement of, 74
„ flooring, how measured, 51
„ grounds, „ 68, 87
„ „ example of measuring, 68
„ gutter bearers, how measured, 56
„ partitions, „ 58, 74
„ roofs, how measured, 61
„ spandrel to stairs, example of measuring, 77
„ timber, how measured, 51
„ trusses, „ 54
Frames and sashes, „ 66, 86
„ „ painting of, how measured, 114, 117
„ bedding and pointing to, „ 21
„ door, example of measuring, 73
„ pointing to, reparation of, how measured, 126
„ reparation of, how measured, 127
French casements, „ 67
Friezes, plaster, „ 102
Furnace bars, „ 94

Gas company, fees to, 96
Gaseliers, 95
Gasfitter, 95
Gates, iron, how measured, 94
„ „ reparation of, how measured, 129
„ painting of, „ 114, 116
Gauged arches, how measured, 16, 20
Gilders' work, table of, 118
Gilt lettering, how measured, 117
Girder, flitched, example of measurement of, 53
Girders, cast-iron, how measured, 95
„ flitched, „ 91
„ oak trusses to, „ 53
„ riveted, „ 92

Girders, example of measurement of wrought, 92
„ wood, how measured, 52, 61
„ rolled, „ 94
Glass, semicircular, „ 119
„ tiles and slates, how measured, 120
Glazed stoneware drain pipes, „ 21
Glaziers' work, description of, how measured, 119
„ table of, 120
„ reparation of, how measured, 128
Glossary of terms, 3
Gothic roof, how measured, 51
Grained work, „ 116
Grating bars „ 93
Gratings, brass, „ 109
„ iron, „ 95
„ „ reparation of, how measured, 129
Groined arches, 17
„ cutting to, 17, 20
Groins, centering for, how measured, 60
Grooves in joinery, labour to, 68, 87
„ in slate, how measured, 24
„ stone, „ 38, 41
Ground joists, „ 52, 61
Grounds, deal, „ 65, 86
„ framed, „ 65, 68, 87
„ „ example of measurement of, 68
Gully traps, how measured, 19
Gutter boards and bearers, how measured, 55, 62
Gutters, cast iron, how measured, 94
„ cesspools in, „ 56
„ drips in, „ 62
„ example of measuring, „ 56
„ forming in flat, „ 57
„ framed bearers for, „ 56
„ iron, reparation of, „ 129
„ lead, „ 107
„ painting of, „ 114
„ wooden, reparation of, „ 127
„ zinc, „ 112

Hacking out for reparation, „ 128
Half-sawing to stone, „ 37, 40
Hammer-dressed arch, „ 40
Handrail, „ 81, 88
„ painting of, „ 115, 117
„ polishing of, „ 117
„ wrought iron, „ 94
Hanging paper, how measured, 121
Hartley's patent plate-glass, how measured, 120
Heads to down-pipes, iron, „ 95
„ to down-pipes, painting to, „ 114, 117
„ to down-pipes, reparation of, „ 128
„ to down-pipes, zinc, „ 111

Heads to iron principals, how measured, 95
„ to keystones, „ 41
Hearths, cement, „ 103
„ front and back, reparation of, how measured, 127
„ York stone, how measured, 34, 40
„ „ notchings to, how measured, 34, 39
Herring-bone strutting, how measured, 52, 62
Hinges, „ 89
„ reparation of „ 129
Hip and T hooks, „ 22
„ rafter, how to find length of, how measured, 22
„ rolls, how measured, 54
„ tiles, „ 22
Hips, allowance for, in tiling, how measured, 21
„ and valleys, allowance for, „ 23
„ mitres to, how measured, 22
„ reparation of, „ 128
„ slate, „ 25
Hoisting and setting to stone, how measured, 33, 40
„ stone above 40 ft., „ 33, 36, 40
Hole for trap in sink, „ 35, 40
Holes cut and dished to W. C. „ 89
„ for pipes in York paving „ 33, 40
„ for shutter bars, „ 70
Hollow iron columns, „ 93
Hoop-iron bond, „ 18
Housing, description of, „ 80
Housings in stonework, „ 41
„ to architraves, „ 65
„ to skirtings, „ 86
„ to staircase, „ 78, 80, 88

Ignorance of technical terms, 4
„ of surveyors of methods of working stone, 28
Insurance of building, 124
Internal mitres, how measured, 41
Intersecting mitres, „ 41
Iron balusters, how measured, 82, 90, 94
„ „ painting of, „ 115, 117
„ balconies, reparation of, „ 129
„ bars, „ „ 129
„ beams, „ „ 129
„ bolts, „ 93
„ „ reparation of, „ 129
„ brackets, „ 96
„ columns, „ 93, 95
„ „ reparation of, „ 129
„ coppers, „ 94
„ cresting, „ 95
„ „ painting of, „ 117
„ cramps, reparation of, „ 127
„ door linings, „ „ 129
„ doors, „ „ 129

Iron fencing, injury to, 126
„ flitched beams, how measured, 61
Ironfounder, 91–95
Iron gates, reparation of, how measured, 129
„ girders, „ 94, 95
„ gratings, „ 94, 95
„ „ reparation of, „ 129
„ gutters, „ 95
„ „ reparation of, „ 129
„ handrail, „ 94
„ heads to rain-water pipes, „ 95
„ „ reparation of, how measured, 129
„ hinges, reparation of, how measured, 129
„ latches, „ „ 129
„ locks, „ „ 129
Ironmongery, abbreviation of terms used in, 133
„ to joiners' work, how measured, 85, 89, 90
„ to shop fronts, „ 77
Iron newels, how measured, 90
„ „ painting to, how measured, 117
„ railing, „ „ 115, 116
„ „ reparation of, „ 128
„ rain-water pipe, how measured, 95
„ „ reparation of, how measured, 129
„ revolving shutters, how measured, 78
„ rim locks, how measured, 90
„ riveted girders, „ 92, 94
„ shoes, „ 95
„ „ reparation of, how measured, 129
„ shutter lifts, „ 90
„ stubs and plates, „ 90
„ supports, reparation of, „ 129
„ T and cross, „ 92
„ tanks, „ 94
„ ties, reparation of, „ 129
„ tongue and groove, „ 90
„ weight of cast and wrought, how measured, 94
„ window-guards, how measured, 94
Ironwork, table of measurement of, 94, 95
Iron, wrought and cast, difference of measurement of, 91
Irregular-shaped stone, cutting of, how measured, 31
Items, omission of, how prevented, 11

Jamb linings, door, example of measurement of, 74
„ how measured, 74
„ painting of, how measured, 115
Joggle joints to York stone, how measured, 34, 40
Joiner and carpenter, distinction between, 50
„ and carpenter, their work, how taken, 50–62
„ and ironmonger, 63–90
Joiners' work, description of table, 85
„ measurement of, 63–90
„ order of taking items of, 64

Joiners' work, table of measurement of, 85–90
„ what included in price of, 64
Joinery, abbreviation of terms used in, 132, 133
Joints and beds to stonework, how measured, 37, 40
„ joggled, how measured, 34, 40
„ in lead pipes, „ 110
„ to brickwork, reparation of pointing of, how measured, 126
„ to coping and curbs, variation in measurement of, 35
„ to curbs and coping, how measured, 40
„ to stonework, reparation of pointing of, how measured, 127
Joists, ceiling, how measured, 57
„ ground, „ 61
„ in what order taken, 52
„ reparation of, how measured, 127

Keene's cement, how measured, 102, 104
Kitchen dresser, „ 83, 89
Knobs to doors, painting of, how measured, 114
Knockers, how measured, 89
„ painting of, how measured, 114
Knotting and stopping, „ 116
Knowledge of art of building required, 5
„ of building trades, 5

Labour in bends and junctions to soil pipes, how measured, 110
„ in carpenters' work, how measured, 60
„ included in price of cube stone, 4
„ in quantities, how shortened, 6
„ on stone quoins to rubble, how measured, 30
„ on slate, how measured, 25
„ on stonework, „ 36
„ to decayed stone, &c., reparation of, how measured, 127
„ to doors and framed spandrels, „ 77
„ to fir, how measured, 62
„ to Gothic roof, „ 51
„ to framed timber, how specified, 51
„ to grooves in joinery, how measured, 87
„ how omitted in stonework, 28
„ to stone, how taken, 29
„ to handrail, how measured, 81
„ to mitres in plasterers' work, how measured, 101
„ to newel, how measured, 82
„ to plumbers' work, how measured, 109, 110
„ to mortises in York stone, how measured, 34
„ to zinc flat, how measured, 112
„ on wrought stone, measurement of, 29, 30
Labours of mason, description of various kinds, 31, 33, 34
Landings, reparation of, how measured, 127
„ of York, „ 33
„ of York, over 6 feet thick, how measured, 34
„ of York, when exceeding 30 feet high, how measured, 34
„ of Portland, &c., how measured, 39

Latches, 56
„ reparation of, how measured, 129
Lath and plaster, „ 100, 102, 104
Lathing, „ 104
„ reparation of, „ 128
Laths, „ „ 127
Lavatory, leadwork to, „ 110, 111
Lead, aprons, „ 108
„ cheeks, „ 108
„ covering to dormers, „ 108
„ flats, „ 107, 110
„ flashings, „ 107, 108, 110
„ gutters, „ 107, 110
„ lights, glazing in, „ 119
„ „ reparation of, „ 128
„ milled, „ 107, 110
„ pipes, „ 109
„ „ joints in, „ 109
„ sheet, „ 107, 109
Leadwork, finding weight of, example of, 109
„ table of, 110, 111
„ reparation of, how measured, 128
„ to cisterns, „ 109
„ to finials, „ 109
„ to sinks, „ 109
Leather straps to spring doors, „ 90
Leave all clean and complete, 124
Ledged doors, how measured, 71, 86
Lever pulls to bells, „ 97
Lights, zinc metal, „ 111
Lime and hair filletings, „ 21, 22, 24
Limewhiting, „ 103, 105
Lining paper, „ 121
Linings, angles to, „ 88
„ iron reparations, how measured, 129
„ to casements, „ 67, 87
„ to doors, painting of, „ 115
„ to doorways, „ 87
„ splayed, „ 68
„ example of measuring, 74
„ to trap-doors, how measured, 57
„ jamb, „ 74
„ lead, to cisterns and sink, how measured, 110
„ to well-holes, how measured, 81
Lintels, fir in, „ 61
Lithography, cost of, how charged, 124
Local stone walling, how measured, 39
Locks, how measured, 89, 90
Locks, reparation of, how measured, 129
Louvres, slate, „ 25
Lumps and firebricks, „ 15

MAINTAINING works, where mentioned, 124
Malleable zinc in flats, how measured, 110
" " gutters, " 110
Margin of allowances for, how given, 3
Masonry, rubble, how measured, 29
" wrought, " 30, 31
" abbreviation of terms used in, 132
Masons' work, description of, 15–42
" how labour included in price of cube stone, 4
" table of, 39–42
" reparation of, how measured, 127, 128
Matched and beaded boarding, how measured, 62
Measurement of bellhangers' work, 96, 97
" of bricklayers' work, 12–21
" " " table of, 20, 21
" " " reparation of, 126
" of carpenters' work, 50–62
" " " table of, 61, 62
" " " how differs from joiners' work, 50
" " " reparation of, 127
" of carving to mason, 39, 41
" " to wood, 76
" of cast-iron work, 93, 95
" of drains, 18
" of excavators' work, 9, 11
" " " table of, 11
" of foundations, 12
" of gilders' work, 118
" " " table of, 118
" of glaziers' work, 119
" " " table of, 120
" " " reparation of, 128
" of grained work, 116
" of gasfitters' work, 95
" " " table of, 96
" of ironmongers' work, 89, 90
" " " table of, 89, 90
" " " reparation of, 128
" of joiners' work, 63–90
" " " table of, 85–90
" " " reparation of, 127
" of masons' work, 27–42
" of masons' work, table of, 39–42
" " " reparation of, 127
" of omissions, 6
" of paperhanger, 121
" " table of, 121
" of paperhanger, reparation of, 129
" of painters' work, 113–117
" " " table of, 116, 117
" " " reparation of, 128
" of plasterers' work, 62

Measurement of plasterers' work, table of, 103–105
„ „ „ reparation of, 128
„ of plumbers' work, 106
„ „ „ table of, 110, 111
„ „ „ reparation of, 128
„ of reparations, 126–129
„ of slater and slate mason, 23–26
„ „ „ table of, 25
„ „ „ reparation of, 127
„ of smith and founder, 91–95
„ „ „ table of, 94, 95
„ „ „ reparation of, 128, 129
„ of tilers' work, 21, 22
„ „ table of, 22
„ „ reparation of, 126
„ of writer, 117
„ of zinc-worker, 111
„ „ table of, 70
„ „ reparation of, 128
„ one system recommended, 6
„ uniformity of, 3
„ where to commence, 8
„ how to find, easily, 7
Measurements contrasted between Scotch and English, 48, 49
Measuring book, example of, 6
„ from building, 5
„ up, description of, 6
„ up, extras and omissions, 6
„ up, number of columns necessary, 6
Mensuration, knowledge of ordinary rules, 5
Metal lights, how measured, 111, 112
Method of measuring, 8
„ pursued in this book, 8
„ pursued to prevent omission of items, 11
„ of calculation of weight of wrought iron, 94
„ of shortening taking out of quantities, 6
„ of finding length of hip rafter, 22
„ of reducing brickwork to standard thickness, 19
Metropolitan surveyors, 3
Milled and sheet lead, how measured, 107, 110
Mitred angles, „ 42
„ „ for skirting to seat of W. C., how measured, 89
„ boarder in flooring, how measured, 85
Mitres, how measured, 41
„ in plaster, how measured, 99, 104
Mortised latches, how measured, 89
Mortise locks, „ 90
Mortises to York stone, „ 34
Moulded work, description of, to stone, 32
„ „ circular, 32
„ skirtings, how measured, 103
„ work in cornices, „ 41
„ splayed stoppings, &c., how measured, 41

Mouldings, deal, how measured, 88
Mouldings, painting of, how measured, 114, 116
„ to plasterers' work „ 99
„ stops, angles, &c. „ 21
Mouthpieces to speaking pipes, how measured, 112

Naked floors, how measured, 52
Neck bolts, „ 89
Newels „ 88
„ paint work to „ 115, 117
„ ornamental „ 89
Norfolk latches „ 90
Number of slates required, short way of finding, 26
" Numbers," order of, in billing, 11

Omissions covered by builders measuring fully, 3
„ description of, 6
„ how improperly allowed for, 3
„ how measured, 6
„ of items, how prevented, 11
Omitting labour on stonework, by sketches, 28
Operations necessary to produce bills of quantities, 5
Order of trades given in tables, 11
Ornamental heads to rain-water pipes, painters' work, how measured, 114, 117
Ornamental iron balusters, how measured, 82
„ „ painters' work, how measured, 115
„ newels, how measured, 89
„ railings, painters' work „ 116
„ style, writer, „ 118
„ tiling, „ 21
Osmatic action, how prevented, 30
Outlets, iron, how measured, 95
„ to gasfitters' work „ 96
„ to zinc gutters „ 112
„ pipes, painters' work, „ 111
Ovens, how measured, 15

Painters' work, how measured, 113
Painting to T nails and hip hooks, how measured, 22
„ abbreviations of terms in, 133
Pairs, porcelain finger plates, how measured, 90
„ butts, how measured, 89
„ steel centres on plates, how measured, 89
Panels to plasterers' work, „ 101
„ to painters' work, „ 115
Pantiles, how measured, 22
Pantiling, reparation of, how measured, 126
Paper and hanging, „ 121
„ box, deal, how measured, 89
Paperhangers' work, „ 121
„ „ preparation of, 121
Parapets, floriated moulded, to plasterers' work, how measured, 99

Pargetting, how measured, 14
Partitions, framed, how measured, 76
Patent swing hinges, 89
Pateras at angles, how measured, 69
„ in plaster, „ 105
Patience and tact necessary to student, 5
Pavement, reparation of, how measured, 126
Paving, brick, how measured, 18
„ concrete, „ 10
„ landing, &c., „ 39, 40
„ slate, „ 25
„ tile, „ 18
„ Yorkshire, „ 33
„ reparation of, „ 127
Pendants, cut, how measured, 89
Perforated stone, „ 42
Piecing stone, reparation, how measured, 77
Pilasters, deal, how measured, 75, 86
„ plasterers' work, „ 99, 103
Piling, how measured, 10
„ ironwork, how described, 10
Pinning slates to walls, how taken, 24
Plain face to Portland stone, how measured, 38, 40
„ girders, how measured, 95
„ mouldings in cement, how measured, 103
„ tile creasing, how measured, 22
„ tiling, „ 22
„ window-guards, „ 94
„ work, description of small works to stone, 31
„ „ in beds and joints to Portland stone, how measured, 37, 40
Plancere, deal boarded, how measured, 88
Planing slate, how measured, 25
Planking and strutting, how described, 10
„ to fir, labour, how measured, 62
Plasterers' work, abbreviation of terms in, 133
„ deductions from, 88
„ description of, 98
„ reparation of, 128
Plastering and lathing to partitions, how measured, 102
Plate glass, how measured, 120
Plate-rack, „ 83, 89
Plates, lintels, and wood bricks, material of, how measured, 61
„ labour to, how measured, 53
Plinths, how measured, 28
„ to painters' work, how measured, 114
Plugs and cramps to York stone, how measured, 35
„ to plumbers' work, how measured, 109
Plumbers' work, „ 106
„ difficulty of measuring, 106
Pointing and bedding to frames, how measured, 21
„ how charged, 15
„ how measured, 16, 18
„ reparation of, how measured, 126

Pointing to flashings, how measured, 21, 109
„ to pavior, reparations of, how measured, 127
Pole plates, „ 54
Polishing to painters' work, „ 116
Portland, Bath, and other building stone, description of, 36
„ „ how measured 36, 40, 41
„ „ labour to, 37, 38, 39, 41
Portland stone, ashlar work, how measured, 41
„ „ carving, „ 39, 41
„ „ paving landing, „ 39, 40
„ cement work, „ 103
„ „ flooring, „ 105
„ „ hearths, „ 105
Preparing walls for paperhanger, „ 121
Proper arrangement for abstracting, for bricklayers' work, 19
Puddling, how measured, 10, 11
Pulls to bells, „ 97
Pumps, „ 110
„ taken in addition, how measured, 10
Putty, composition, how measured, 78

Quadrant regulator, brass, how measured, 90
Qualifications necessary for student, 5
„ of student, 4
Quantities, bills of, operations necessary to produce, 5
„ deduction off, of percentage, 4
„ excess of, how met by builders, 4
„ full, how allowed for by builders, 4
„ how to shorten labour in taking out, 6
„ refusal of builders to measure up entire building, 4
„ surveyors differ, 4
„ what parts supplied to builders, 5
Quarry lights to glaziers' work, how measured, 120
Quarter partitions, „ 58
Quatrefoil sinkings, „ 41
„ to glaziers' work „ 120
„ to painters' work, „ 117
Quirks and beads to carpenters' work, how measured, 9
„ to plasterers' work, „ 99
Quoins, how measured in rubble work, 30

Rafters, how measured, 54
„ hip, method of finding length, 22
„ reparations of, how measured, 127
Railings, grating bars, „ 93
Rain-water pipes, cistern heads to, reparation of, how measured, 129
„ gutters to, „ „ 129
„ how measured, 94, 112
„ reparation of, how measured, 129
„ shoes to, reparation of, how measured, 129
Ramps to handrail, how measured, 89
„ to skirtings, „ 86

Ranges, how measured, 95
Ranges and stoves, setting to, how measured, 21
Reason why given, definition of stonework, 32
Reasons why builders' prices are erratic, 4
Rebated drip to gutter, how measured, 62
„ mortise locks, „ 90
Rebates, grooves, and throats in stonework, how measured, 38
„ „ tongues in slate, „ 24
„ labour to, how measured, 62
Relieving arches, „ 21
„ how charged, 17
Rendering, how measured, 18, 104
Repairs, 125
Result of elaborate measurement, 28
Returned ends to carpenters' work, how measured, 86
„ mitred, and stopped ends in stonework, how measured, 41
Reveals, how measured, 13, 15
„ reparation to, how measured, 128
Revolving shutters, „ 78
Ridges, how measured, 24
„ how set, 24
„ tiles, how measured, 22
Rim to trap-door, „ 57
Riser, staircase, example of measurement, 80
„ to steps, how measured, 35
Rising butts, „ 89
Riveted girder, „ 92, 94
„ tanks, „ 94
Roofs, „ 54
„ Gothic, „ 51
Rough boarding, „ 57
„ cutting, „ 16
„ sunk work, „ 40
„ rendering in cement, how measured, 104
Rubbed curb, how measured, 40
Rubble stone, „ 29, 39
„ walling quoins, how measured, 30
„ „ stone arches, extra allowed for, 29
„ „ „ small openings allowed for, 30
„ „ „ when deductions made for, 30
Rules of mensuration necessary, 5
"Runs," order of, in billing, 10

Sashes and cased frames, how measured, 66, 86, 117
„ frames with circular heads, how measured, 67
Sash fasteners, how measured, 66, 90
„ doors, „ 71
„ frames, reparation of, 126
„ „ and sashes, painters' work, how measured, 114
Sawing, how measured, 40
Scarfing and laps to timber, how measured, 51
Schedule of quantities (see Bills of Quantities), 5
Scotch measurements, masons' work, 48

Scotch measurements, table of, as contrasted with English, 48, 49
Scrapers, painters' work to, how measured, 114
Screw nut and joints, how measured, 89
Scribing floors for walls, „ 65, 85
Scrolls to newels, „ 89
Scubbling, methods of describing, 29
„ ornaments in stone, how measured, 41
Segmental arches, cutting to, how measured, 17
„ heads to glazier, „ 119
Semicircular arches, centres to, „ 61
„ sheets to glaziers' work, how measured, 119
„ stoppings to plasterers' work, „ 62
„ work, how measured, 14
Separate entry of similar items undesirable, 6
Service boxes, how measured, 111
Setting and hoisting to stone, how taken, 33
„ chimney-pieces, how measured, 21
Sheet glass, how measured, 120
„ lead, „ 109
Shelves, „ 87
„ slate, „ 24
„ York stone, „ 34
„ and slabs, reparation of, how measured, 126
Shoes to feet of principals, how measured, 62
„ to iron columns, „ 95
„ to rain-water pipe, zinc, „ 112
„ „ to painters' work, how measured, 114, 117
Shop fronts, how measured, 77
„ shutters, „ 78
Shrinkage of timber, allowance for, 51
Shutters, bars, how measured, 93
„ boxed, „ 70, 115
„ revolving, „ 78
„ sliding, „ 70
Sill, stone window, how measured, 43
Sills, door, how measured, 73
„ stone, painting of, how measured, 114, 117
„ wood, reparation of, „ 127
„ York stone, „ 35, 40
„ „ labour to, „ 35, 40
„ wood, „ 67, 73
Sinking in floor for mat, with straight joint all round, 64, 85
Sinks, how measured, 25
„ lead, „ 109
„ reparation of, how measured, 127
„ stone, „ 35, 40
„ York stone, „ 35, 40
Situation of work must be described, 6
Sizes of slates and names, 24
Skewback, example of measuring, 17
Skirting, square, how measured, 65, 85
„ tongued or mitred angles, how measured, 65, 86
Skirtings, cement, how measured, 103

Skirtings, how measured, 115, 116
„ round seat of W. C., how measured, 89
„ slate, how measured, 25
Skylights, „ 116
„ zinc, „ 111
Slater and slate masons' work, 23–26
„ „ table of, 25
Slates, number of required, short way of finding, 26
Slates, for damp course, how described, 18, 24
„ glass, how measured, 120
Slating, boarding for, how measured, 62
„ labour to, „ 24, 25
„ measurement of, 23, 25
Sleepers, material, how measured, 61
Smith and founders' work, „ 91, 95
Socket pipes in plumbers' work, how measured, 108
Sockets to gasfitter, how measured, 96
Soffits moulded to doors, „ 87
„ to stairs, „ 101
Soil, necessity for description of, 9
„ pipe, how measured, 110
Soldering to plumbers' work, how measured, 128
Solid iron columns, how measured, 93
Sound-boarding, „ 62, 87
Spandrel in glaziers' work, how measured, 120
„ of arches, concrete filling in to, how measured, 10
„ steps, example of measuring, 42
Speaking tubes, how measured, 112
Specification departed from, how building measured, 5
Specimen of ruling paper for entering dimensions, 7
Spherical work, description of, to masons, 32
Splayed cutting and waste, how measured, 62
„ linings, „ 68
„ soffit, centering to, „ 61
„ stop ends to chamfer, „ 41
Splays under 3 in. wide, „ 38
Spring piece to trimmers, „ 62
Squint quoins, how measured 16, 20
Staining to painters' work, how measured, 116
Staircase, examples of measuring, 78, 80
Staircases, how measured, 78–83, 88, 89
Stairs, spandrel framing to, how measured, 77
Stall-board, how measured, 77
Standard thickness of brickwork, reducing to, 19
Steining to wells, how measured, 10
Step, curtail to, „ 88
Step-ladder, „ 117
Steps, York stone, „ 35, 40
„ back joint to, „ 35, 40
„ risers to, „ 35, 40
„ and landings, „ 127
Stone, arches, extra allowed for, in rubble work, 29
„ brick lining for, how measured, 30

Stone sills, how measured, 72
„ example of measuring arch stone, 44
„ „ cornice, 45
„ „ heads to window, 45
„ „ spandrel step, 42
„ „ window sill, 43
„ irregular shape, mason, cutting, 30
„ „ example of, 31
„ hoisting and setting, how taken, 33
„ labour on, „ 30
„ localities, methods of measuring vary, 29
„ in sinks, sills, &c., reparation of, how measured, 125
„ Portland, Bath, and other building stones, descriptions of, 36
„ „ „ customary method of measuring, 36
„ Portland carving, how measured, 39
„ „ chimney-pieces, „ 38
„ „ moulded work, „ 38
„ „ labour to, 37–39
„ rubble, when deductions made, 30
„ „ walling, how measured, 29
„ York, angle stones, „ 35
„ „ copings, „ 34, 40
„ „ cramps and plugs to „ 35
„ „ curbs, 34
„ „ labour to, 34
„ „ landing, measurement of, 33
„ „ paving, how measured, 33
„ „ shelves, „ 34
„ „ steps, 35, 40
„ Yorkshire, description of work on, 33
„ „ measurement of, 32–35
„ „ „ in walling, 32
Stoneware drain pipes, how measured, 21
Stonework, ashlar work, „ 30, 36
„ differences of measurement exist, 27
„ how measured, 28, 41
„ description of various labours on, how measured, 31
„ uniform measurement desirable, 36
„ when raised more than 40 feet high, how measured, 33, 36
„ over 6 feet in length, how measured, 33
„ table of, 39–42
„ contrast between English and Scotch, measurement of, 47
„ various local methods of measuring, 29
Stop chamfers, how measured, 41
Stop-cocks, „ 96
„ to plumbers' work, how measured, 109
Stopped ends and outlets to gutters, zinc, how measured, 112
„ in painters' work, how measured, 114
„ in stone „ 41
„ in ironwork „ 95
„ to moulding, „ 41
„ to plasterers' work cornices, 102, 104
„ to sinkings, how measured, 41

Stopping and whitening, how measured, 105
Stops to moulding in cement, 104
Stout rough fillets nailed to girder, how measured, 62
Stoves and ranges, how measured, 95
„ setting of, „ 21
„ backs, „ 126
Straps, how measured, 94
String, wall, „ 55
Strings to staircases, „ 115, 116
„ when deducted, 14
„ courses, how measured, 28
„ when deducted, 14
„ to plasterers' work, how measured, 99
Strutting, how measured, 9, 11, 52
„ where necessary, 9
„ and planking, how described, 14
Student, how to find dimensions, 36
„ qualifications of, 4
Stubs and plates, how measured, 90
Sun-burners, how measured, 96
Sunk work, description of, to mason, 31
„ circular „ „ 32
"Supers," order of, in billing, 11
Supports to plumbers' work, how measured, 129
Surveyors, adopting their own peculiar methods, 3
„ measure full, to give margin for omissions, 3
„ metropolitan, 3
„ quantities differ, 4
„ some make allowance for circular work, 17
Swan-necks, how measured, 111
„ in painters' work, how measured, 114, 117

TABLES:—
I. excavators' work, 11
II. showing order of measurement of bricklayers' work, 20
III. „ „ tilers' „ 22
IV. „ „ slaters' „ 25
V. „ „ masons' „ 39
VI. showing difference between English and Scotch method of measuring masons' work, 48
VII. showing order of measurements—carpenters' work, 61
VIII. „ „ joiners' „ 85
IX. „ „ smiths' and founders' work, 94
X. „ „ gasfitters' work, 96
XI. „ „ bellhangers' „ 97
XII. „ „ plasterers' „ 103
XIII. „ „ plumbers' „ 110
XIV. „ „ zinc-workers' „ 112
XV. „ „ painters' „ 116
XVI. „ „ gilders' „ 118
XVII. „ „ glaziers' „ 120
XVIII. „ „ paperhangers' work, 121
XIX. „ „ reparations, 126

T and cross iron, how measured, 92
Tables answer two purposes, 11
Tact and patience necessary to student, 5
Taking off, hurry provided for improperly, 4
„ method of, 6
„ description of, 5
Taking out, method of shortening labour, 6
Tallboys, zinc, how measured, 111
Taste, 2
Technical terms, ignorance of, 4
Tees, how measured, 96
Templates, how measured, 36
„ oak, how measured, 59, 61
Tenders, variation in, cause of, 4
Terminals, how measured, 41
Thresholds to York stone, how measured, 35
Throats, grooves, and rebates to mason, how measured, 38
Ties, ironmonger, how measured, 129
Tile paving, how measured, 18
„ creasing „ 18
„ „ in reparation, how measured, 126
Tiles, in reparation, „ 126
„ glass „ 120
Tiling, pan, plain and ornamental, „ 21
Tilting pieces, „ 62
„ fillets, „ 55
Timber, framed, how specified, 51
T nails, to tiling, „ 22
Tongues, rebates, grooves in slate, how measured, 24
Tooled paving, „ 40
Trades:—
Excavator, 9
Bricklayer, 12–21
Tiler, 21, 22
Slater and slate mason, 23–26
Mason, 27–49
Carpenter, 50–62
Joiner and ironmonger, 63–90
Smith and founder, 91–95
Gasfitter, 95, 96
Bellhanger, 96, 97
Plasterer, 98–105
Plumber, 106–111
Zinc-worker, 111, 112
Painter, 113–118
Grainer,
Stainer,
French polisher,
Writer,
Gilder,
Glazier, 119, 120
Paperhanger, 121

Trades, building, thorough knowledge necessary, 5
„ knowledge, practical, necessary, 5
Transoms and mullions, how measured, 67
Transoms to doors, „ 73
Trap-doors, „ 62
Traps in plumbers' work, „ 109
Treads to stairs, reparation of, how measured, 127
Trefoils in glaziers' work „ 120
Trenches, how measured, 9, 11
„ work to, how described, 9
„ for drains, „ 10
Trimmer arches, how measured, 18
„ how measured and valued, 14
Trumpet-mouthed standing waste, how measured, 110
Truss, „ 41
„ roof, „ 54
„ oak, „ 53
„ girders, „ 53
„ in plaster, reparation of „ 128
Tubing, zinc or copper „ 97, 112
Turning pieces to arches 4½ soffit, „ 60, 62
Turn-buckles, „ 90

Uniformity of measurement, 3
Unions in plumbers' work, how measured, 109
Urinals, how measured, 110
Usual method of measuring block-stone, 15

Valley boards, how measured, 62
Valleys in tiling, allowance for, 22
„ in slating, „ 23
Valuing trimmers, 14
Variations in tenders, cause of, 4
Vaulting to arches, 16
„ how measured, 16
Vaults, centering for, „ 60, 61
Varnishing, „ 117
Ventilators, zinc, „ 111
„ building in, „ 21

Wallings, Yorkshire stone, description of measurement, 32
Walls, in dilapidations, how taken, 78
„ in masonry, 127
„ method of measuring, 12
„ plate addition for, 14
„ pointing of, 126
„ removal and reinstatement, 125, 126
„ same height and thickness, how collected, 6
„ string tongued and mitred angles, &c., how measured, 88
„ when of less than standard thickness, „ 12
Washers in plumbers' work, how measured, 109, 110
Wash-hand basins and lavatories, how measured, 111

Washing, stopping, and whitening ceilings, how measured, 105
„ and distempering ceilings, „ 105
„ „ to cornices, „ 105
„ „ to enrichments, „ 105
Waste, description of, 6
„ example of, 6
„ how obtained, 6
„ object of, 6
„ and cutting to York paving, how taken, 34
Water bar, how measured, 67
Water-closets, how measured, 89
„ apparatus, „ 109, 111, 128
„ pan, „ 128
Weather boarding, how measured, 58, 62
„ in reparation, how measured, 127
Weathered and throated rubbed window sills, how taken, 40
Weathering plain face in plasterers' work, how measured, 103
Well-holes staircases, lining to, how measured, 81
Wells, curbs to, 10
„ description necessary to be given, 10
„ price per yard, increased per yard, 10
„ where steined, how described, 10
Whistles and chains to speaking pipes, how measured, 112
Whitening, how measured, 103
Winders to staircase, how measured, 80
„ housing treads, 88
Window back, deduction for, 14
„ backs, how measured, 69, 87
„ boards, „ 68, 87
„ sills, when deducted, 14
„ „ example of measurement, 43
„ head, „ 45
„ linings, how measured, 67, 87
„ measurement of, in painters', how measured, 72
„ openings, example of measuring, 14
Wood bricks, materials in, how measured, 61
Wooden girders, how measured, 53
Woodwork, deductions for, 14
Working drawing, difficulties of student measuring from, 5
Works, where not carried out according to drawings, how measured up, 5
Wreath to newels, how measured, 89
Writing, „ 117
Wrought iron, „ 91, 94
„ „ chimney bars, how measured, 15
„ „ method of calculation, 93
„ „ table of measurement, 94
„ „ weight of, 94
„ stonework, description of measurement, 30

Yorkshire stone, angle stones, how measured, 35
„ curbs, „ 34, 40
„ copings, „ 34, 40
„ cramps and plugs, how measured, 35, 40

Yorkshire stone, sills, how measured, 35
„ cutting pinning to landing, how measured, 40
„ corbels, how measured, 40
„ description of work on, 33
„ hearths, how measured, 34
„ how measured, 32–36, 40
„ hoisting and setting, how taken, 33
„ joggle joints, how measured, 34, 40
„ labour to, „ 32, 33, 34
„ landings, „ 33
„ „ when over 6 inches thick, how measured, 34
„ mortises, how measured, 25, 34
„ notches in, „ 34
„ paving, „ 33, 40
„ shelves, „ 34
„ steps, „ 35, 40
„ sinks, „ 35, 40
„ sink-stones, „ 35
„ thresholds, „ 35
„ templates, „ 36
„ variation of measurement to joints, 35
„ when exceeds 30 feet super, how measured, 34
„ window sills, how measured, 40

Zinc tallboys, how measured, 111
„ ventilators, „ 111
„ skylights, „ 111
„ work, „ 111
„ „ table of, „ 112

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A REVIEW OF THE DEFECTS OF EXISTING MODEL LODGING-HOUSES, AND CONTAINING REGISTERED DESIGNS FOR MODEL HOUSES, FROM WHICH BUILDINGS HAVE BEEN ERECTED BY THE AUTHOR;

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REGISTERED PLANS FOR THE ADAPTATION OF EXISTING DWELLING-HOUSES FOR LETTING IN FLATS.

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A GENERAL VIEW OF THE NECESSARY CLAUSES WHICH SHOULD BE CONTAINED IN A NEW ACT OF PARLIAMENT.

TO WHICH IS ADDED

"SANITARY HINTS, OR HOW TO KEEP THE HOME HEALTHY."

BY

BANISTER FLETCHER, F.R.I.B.A.;

AUTHOR OF "QUANTITIES," "DILAPIDATIONS," "ARBITRATIONS," AND "COMPENSATIONS."

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